BRITISH MEDICAL JOURNAL

LONDON SATURDAY OCTOBER 28 1939

PROPHYLACTIC IMMUNIZATION AGAINST MEASLES, SCARLET FEVER, DIPHTHERIA, WHOOPING-COUGH, AND INFLUENZA *

BY

SIR J. C. G. LEDINGHAM, LL.D., D.Sc., F.R.C.P., F.R.S.

Director, Lister Institute, London; Professor of Bacteriology, University of London

The prevention of infectious disease by active immunization methods is no new thing, and I am going to assume that what is chiefly wanted at the moment is some reassertion and fortification of the scientific background of these procedures and some account of their achievements in the field, with a view to rendering them more acceptable to those responsible for the conservation of child life in this country and thus to facilitate much-desired propaganda on the large scale. Whatever may be the reasons—and I hope to suggest some later on—there can be no doubt, I think, that in the field of prophylaxis of the kind we are considering to-day this country has in the main been a follower, and, I'm afraid, rather a tardy follower; for, though our laboratory workers have contributed very materially to the knowledge of methods, we have left to other countries the task of trying them out seriously and intensively in the field.

The safety of any method to be applied to man must always be a prime consideration. There must be no risk to life, and even the minor inconveniences, local and general, incidental to the introduction of a prophylactic through the skin must also, so far as possible, be reduced to a minimum consonant with the effectiveness of the product. In the course of securing these desiderata—and I refer here particularly to the diphtheria prophylactics—there have been in the early period of their use, though not in this country, some very few unfortunate experiences that could not have been foreseen at the time but which further experiment explained and taught us to avoid in future. With the introduction of the Therapeutic Substances Act, however, such accidents should never recur if the prescribed rules for the preparation and testing of prophylactics for issue are carefully carried out, and also if those responsible for administering them perform their duty intelligently. We have now the definite assurance that the prophylactics we are here considering are both safe and potent, and, when administered with the care and circumspection that proceed from knowledge, are calculated to cause only quite negligible inconvenience to the subject inoculated.

Diphtheria

Of the five infectious diseases with whose prevention by prophylactic inoculation I am dealing, diphtheria undoubtedly merits chief consideration because we now know quite definitely from field trials in other countries that intelligent and persistent immunization of the child population, starting with the pre-school child one year old, can bring the diphtheria morbidity down to zero. Indeed, as that great pioneer in this field the late Dr. W. H. Park remarked at the International Congress for Microbiology in London in 1936, "The control of diphtheria by specific treatment and specific prophylactic immunization is one of the most gratifying victories of bacteriology." Let me just enumerate some of the landmarks in the history of this matter.

In 1889 Roux and Yersin demonstrated that the diphtheria bacillus elaborated a toxin, and that to this toxin was due the symptom-complex of diphtheria. This led in the first instance to Behring and Kitasato's great discovery of antitoxin in 1890 and to the treatment of diphtheria by passive immunization methods still current and without a rival. The use of diphtheria toxin for preventive purposes was also early foreshadowed, but many years had to pass before the time became ripe for exploring the possibilities of active immunization in diphtheria control schemes. The Schick test, introduced in 1913, gave us most valuable information regarding natural or naturally acquired immunity to diphtheria at various age groups, and now that we have that knowledge we can to a large extent dispense with it, particularly in dealing with young children. It still, however, has its uses as a guide to prophylactic immunization in the older age groups, in which the proportion of Schick-positive persons steadily diminishes owing to increasing opportunities of acquiring immunity through, it is believed, mild or unrecognized infections contracted from their surroundings.

Then came the era of preventive control by partially neutralized mixtures of toxin and antitoxin. Behring introduced these for human use in 1913, and Park and his colleague Zingher exploited them very successfully in New York during the period 1915–23. These partially neutralized mixtures were not ideal immunizing agents, as they were of doubtful stability and their safety was not easily controlled owing to dissociation phenomena under different conditions of storage which I need not go into. They left much to be desired for acceptable propaganda purposes, but nevertheless when administered by good hands and prepared with the necessary care they did excellent service and showed conclusively what could be done in this way to transform a condition of susceptibility into one of more or less solid immunity.

* Read in opening a discussion in the Section of Medicine at the Annual Meeting of the British Medical Association, Aberdeen, 1939.

The Introduction of Formol-toxoid

The next notable advance was the introduction of modified toxin or toxoid for prophylactic use. Glenny and Südmersen in 1921 recorded the fact that toxin which had been converted into an atoxic product by contact with formalin was capable of immunizing guinea-pigs against diphtheria toxin. Ramon of the Pasteur Institute who in 1922 published the first of an important series of papers on the flocculation that took place in neutral mixtures of toxin and antitoxin, and thereby provided immunologists with an *in-vitro* method of titration, extended his observations to formol-toxoid, or, as he called it, "anatoxine," and found this to behave similarly, showing that its power of combining with antitoxin was unimpaired. In 1924, we are told, he inoculated himself with "anatoxine," and in subsequent years he did much to popularize its use in France and other countries, particularly America. In an address on world experience of formol-toxoid at the jubilee celebrations of the Pasteur Institute last March, Ramon stated that more than three millions have now been vaccinated in France, while in Canada, of a population of ten millions, more than two millions have been immunized. The new antigen was immediately exploited by Park in New York, and by 1935 one million had been immunized in that city. In Paris since 1928 some 50 per cent. of Parisian children have been immunized, and deaths from diphtheria fell from 318 in 1928 to seventy-two in 1938. In December, 1931, it became obligatory to immunize the French soldier against diphtheria and enteric by the use of a mixture of "anatoxine" and T.A.B. vaccine, and since that time tetanus toxoid has been added to the mixture. By the end of 1938 some 800,000 troops had been so vaccinated, and Ramon was able to state that clinical diphtheria was disappearing from the French army. He bemoaned the fact, however, that civilian France, which depended so much on the conservation of its child population, was still too apathetic in the matter of diphtheria immunization, and he looked forward to this procedure becoming obligatory in the civil population. This, I understand, is now the case.

The most arresting figures are gleaned from Canada, where efforts to popularize the immunization of children, on whom diphtheria exerts its worst toll, have been most intense and persistent. Some towns and rural districts in Canada have 70 to 90 per cent. of the child population vaccinated. The experience of the city of Hamilton (150,000 population), which was the first city of this size to attempt to control diphtheria with formol-toxoid, is widely quoted, for no deaths from diphtheria have occurred there since 1930 and no case of diphtheria since 1933. In Toronto, with a population of 650,000, some 104,000 infants have been vaccinated since 1926, and the diphtheria incidence fell in the four years 1930–4 from 164 to 3.5 per 100,000. In 1936 there were only forty-eight cases and two deaths. In New York in 1936 some 75 per cent. of the infant population had been vaccinated. Round about 1924 this city had annually some 10,000 cases of diphtheria with 700 deaths, but in 1936 the cases had fallen to 1,143 and the deaths to thirty-five (or about 0.47 per 100,000 inhabitants. In 1938 the reported cases fell to only 163 in this great city.

It is only when the proportion of vaccinated children reaches 70 or 80 per cent. that, as Ramon says, one sees the real fruits of one's work in a great reduction of the diphtheria incidence, perhaps to zero. We have nothing like this to show in Great Britain. In trials hitherto made in this country the value of prophylactic vaccination against diphtheria can be measured only by the relative immunity of the vaccinated groups as compared with that of the unimmunized. These data are arresting enough, so arresting indeed as to render urgently desirable the immunization of all pre-school children from the age of one year, with a view to the ultimate extinction of this disease from the community. No other method of diphtheria control can offer such prospects. What is the problem in this country?

Our Need of More Intensive Propaganda

The chief medical officers of the Ministry of Health and of the Scottish Board of Health both emphasize the necessity for more intensive propaganda, for the diphtheria incidence remains high and almost stationary. In England and Wales there have been annually some 60,000 to 70,000 cases of diphtheria, with some 3,000 to 4,000 deaths, and in Scotland some 10,000 cases, with 400 to 500 deaths. Sir Arthur MacNalty in his report for the year 1937 informs us that Chester, with 45 per cent. of its children vaccinated, "is probably the best-immunized town in the country." After it come Birmingham, Walsall, Worcester, Leeds, Manchester, and Chatham, "all of which are in the neighbourhood of 35 to 40 per cent." London occupies an unenviable position at the bottom of the list with only some 5.3 per cent. of its child population immunized.

To illustrate what can be done by less intensive or, more correctly perhaps, less effective propaganda so far practised in this country, I may cite briefly from current reports the experiences of the city and county of Aberdeen and of the city of Birmingham. During the period 1935–7 some 16,000 of the 25,000 children on the school rolls in the county of Aberdeen have been immunized, together with some 3,000 to 4,000 pre-school children, the antigen employed being alum-precipitated toxoid (A.P.T.), given by what has come to be known as the one-shot method. It is interesting to note that the parents' consent was obtained for about 80 per cent. of the children attending the county schools, a result most creditable to the intelligence of the Aberdeenshire parent. What has been the effect of this crusade? Among the immunized children there have been since March, 1935, seventy-three notifications of diphtheria, giving an attack rate of 26 per 10,000 children, while among the unimmunized, including some 3,000 known Schick-negatives, the attack rate was 251 per 10,000, or ten times that among the immunized. In the city of Aberdeen active immunization of school children and those of pre-school age began in September, 1936. Unfortunately, parents' consent was difficult to obtain, and only 52.3 per cent. of new school entrants were immunized. During the period September, 1936, to March, 1938, 3,596 children were immunized, of whom fifteen contracted diphtheria, giving an attack rate of 0.4 per cent., whereas among the non-immunized the attack rate was 1.5 per cent., or nearly four times that among the immunized. There were no deaths among the immunized, and the disease was mild.

In the city of Birmingham an immunization crusade was started in 1925, the agent used being toxoid-antitoxin mixture (T.A.M.) in three doses of 1 c.cm. at fortnightly intervals. Those completely inoculated under the age of 15 in 1938 numbered 96,446, or some 42 per cent. of the total population in that group. As for the pre-school group under 5, about 27 per cent. had been immunized by the end of 1938. The total cases of diphtheria in the last five years have varied from 1,019 to 1,359, and the deaths from sixty-three to eighty-four annually. Only

fifty-six cases in all have occurred among the inoculated children, and there have been no deaths.

It is quite clear from these illustrations that it will be necessary to increase greatly the percentage of those immunized before evidence is obtained of any material fall in the general diphtheria incidence.

The Antigens and their Administration

Now let us consider as briefly as possible the problem of antigens and schemes of administration appropriate to each. The Chief Medical Officer of the Ministry of Health remarked in a reference to this subject in his report for the year 1937: "It is unfortunate that the exact technique, preparation of vaccine, and method of administration are still matters of medical controversy. It is probable that the lack of a general standard has militated against the more general adoption of anti-diphtheritic immunization in this country." I would consider this a rather unfortunate statement. Though admittedly there is no general standard, the lack of one has been an advantage rather than otherwise, for it has stimulated valuable comparative field trials, and for several years now we have learnt to know more than one type of antigen which, when administered appropriately, is capable of reducing diphtheria incidence materially. Progress has been impeded by many factors, and not least by what a recent leader writer in the *Journal* calls that "doltish prejudice," not confined to any one social or intellectual stratum, which is fostered by anti-social societies posing as the protagonists of liberty. When liberty becomes anti-social and impedes the application of scientific truth to the improvement of human well-being then I think some form of compulsion is the only remedy, though one might hope it would be merely temporary, pending the wider diffusion of scientific knowledge in the community. I might add that I should have liked to see a far more encouraging lead on the part of health authorities generally, from the Ministry of Health downwards, while giving all credit to those enlightened health authorities who have tried their best.

We have at least four antigens which we know to be potent—namely, F.T., T.A.F., A.P.T., and T.A.M. F.T., or formol-toxoid, has done marvellous service in France, Canada, and the United States, though in the latter country A.P.T. is now largely used, while T.A.F., or toxin-antitoxin floccules, A.P.T. (alum-precipitated toxoid), and T.A.M. (toxoid-antitoxin mixture) have been more popular in this country. The general tolerability of these antigens undoubtedly differs, although possibly some workers with large experience have laid more stress than others on the expediency of guarding against unusual reactions during immunization by performing preliminary detector tests. The Canadian workers who have used F.T. for the most part emphasize the value of Moloney tests, particularly in older children and adults, while in France the matter of unusual reactions with the same antigen has not been greatly stressed.

T.A.F. and T.A.M. are relatively innocuous at all ages, while A.P.T. is well borne in young children. In older children and adults it may give rise to painless nodes, which take some time to disappear. A.P.T., by virtue of the slowness of absorption of the antigen and consequent longer stimulus to the antibody-forming mechanism, can give rise, as Glenny, who introduced it, showed, to a considerably higher antitoxin titre, given in a single dose, than any of the other antigens. For this reason it may well become the antigen of choice for young children, the group we wish above all to see in course of time fully immunized, and there is now a consensus of opinion that no countenance should be given to the use of this excellent antigen in any one-shot method.

Antigenic Values Compared

Fitzgerald and his colleagues have tested on batches of children the comparative value of three doses of F.T., two doses of F.T., one dose of A.P.T., and two doses of A.P.T., and have concluded from the results of actual antitoxin titrations that three doses of F.T. give a superior, but not a greatly superior, immunity to that given by two doses of A.P.T. Two doses of F.T. or one dose of A.P.T. yielded by comparison very poor results. On the other hand Volk and Bunney (1939) found that two doses of A.P.T. given at three weeks' interval were superior to three doses of F.T. at similar intervals.

There is no doubt that it is highly expedient that comparative trials should still go on, for it is desirable in planning extensive crusades to determine what form of antigen and what scheme of administration are best calculated to yield the most lasting immunity, due consideration being always given to the tolerability of the antigen or antigens in the interest of acceptable propaganda. On this point Volk and Bunney make a very pertinent remark: "The ultimate basis," they say, "for evaluating a particular scheme of immunization is whether it protects against diphtheria or not, and not whether it confers Schick-negativity or raises the antitoxin level to any definite point." Further, they remark that, "It is entirely possible that a procedure which results in a lower level of antitoxin than some other may still be the method of choice from the public health standpoint—that is, it might be less expensive, easier to administer, and confer a high enough percentage of immunity to be the most efficient use of the public health dollar in prevention of diphtheria."

In an important study by Jones (1938) the comparative value of F.T. and A.P.T. was tested on guinea-pigs, which after immunization were bled every four weeks for a period of thirty-two weeks, their sera being then tested for antitoxic value. This study emphasized the importance of lengthening the interval between the first and the second dose in a two-dose system. He found A.P.T. to be an excellent primary immunizing agent, and he suggested that if an adequate interval elapsed between the first and the second dose it mattered little which type of toxoid was used for the second or later injections. Whether F.T. or A.P.T. was used, it was important that the dose should contain at least 15 Lf. The interval between doses should in his opinion be prolonged to two months or even longer. It may be noted that in the immunization of horses against tetanus or diphtheria toxins the importance of a lengthy interval between the primary and secondary stimuli is well recognized.

I may here summarize for purposes of discussion the main points on which there is already fairly general agreement:

(1) A single immunizing dose of any antigen is not effective if high and lasting immunity is desired, and, where still used in certain localities, should be abandoned. (2) A.P.T. is *per se* a very significantly more effective reagent than F.T., and if the scheme adopted involved two doses only, then two doses of A.P.T. would give higher levels of antitoxin than two doses of F.T. (3) Any one of the three methods in common use—namely, three doses of T.A.F., three of F.T., or two of A.P.T.—will greatly reduce the diphtheria incidence among the inoculated. Further, as A.P.T. is the most effective antigen and is easily tolerated in children under 8, it may be recommended for the primary stimulus and followed at

not less than one month's interval by two doses either of T.A.F. or F.T. Whether to stick to the same antigen throughout is a matter for discussion. (4) With the knowledge that any one of these systems can be guaranteed to reduce incidence, local health authorities contemplating crusades can still provide useful comparative information by employing two different schemes, probably in alternate children. (5) There is general agreement that longer intervals between doses, and specially between the first and the second dose, are calculated to yield superior results. (6) At the start of a crusade in any community children from infancy to school-leaving age should be immunized in the largest possible numbers. (7) As time goes on immunization would be confined to the pre-school children of 1 to 2 years, and when such children go to school it may be very desirable to give a single reinforcing injection. (8) In children over 10, T.A.F. is to be preferred to F.T. or A.P.T. unless preliminary detector tests are performed. (9) Not until some 80 per cent. of the child population under 15 have been immunized will a material decrease in the incidence rate of diphtheria be realized.

Whooping-cough

I pass now to whooping-cough, which, with a death rate per 1,000 population of 0.043 (England and Wales, 1937), comes next to diphtheria, with a corresponding rate of 0.072. In England and Wales 1,750 deaths from this disease were recorded in 1937, practically all in children under 15. In Scotland in 1938 some 6,000 cases were reported, with 111 deaths of children under 1 year and 105 in the age group 1 to 5. As a killing disease of infancy, therefore, whooping-cough closely rivals diphtheria, and undoubtedly its prevention or control by active immunization methods is a challenge to us all. The prospects of such control, in so far as we may judge from results of crusades of quite recent years, particularly in the United States, are now certainly bright, and there is every reason why health authorities in this country should promptly organize immunization schemes on sound lines, with a good prospect of reducing the incidence of whooping-cough among vaccinated children definitely exposed to this highly contagious and distressing infection.

The aetiological agent of whooping-cough is recognized to be the *Haemophilus pertussis*, originally discovered by Bordet and Gengou in 1906. In recent years valuable bacteriological work has been accomplished in identifying this organism in the early catarrhal stages, when it may be found in some 80 per cent. of cases by the cough-plate method, and also in diminishing percentages as the weeks pass. It is a fortunate thing that the organism is a single antigenic type, for it makes immunization by vaccine far more practicable; but it is also most important for immunization purposes that only smooth freshly isolated and virulent strains be chosen, as artificial passage of the organism on unsuitable media is accompanied by degradation of the efficient antigen and by loss of virulence. It is highly probable that failure to choose strains of full antigenicity for vaccine purposes accounted for conflicting results in some of the earlier trials in the past decade, and that there has also been a failure to follow up carefully the degrees of exposure to this disease not only of the vaccinated but also of the control groups. I propose, therefore, to sketch one or two only of some quite recently recorded crusades which were embarked upon with great care and carried out in the most thorough and painstaking manner.

Studies on Whooping-cough Immunization

Kendrick and Eldering's study (1939) was made in the city of Grand Rapids, Michigan, with a population of about 168,650.

1,815 children between 8 months and 6 years were fully vaccinated with thoroughly tested strains from cough-plates, seventy-two-hour growths being washed off the medium, filtered through cotton-wool, and then centrifuged. The deposit was suspended in saline containing 1 in 10,000 merthiolate or 0.5 per cent. phenol and stored till sterile. It was standardized to 10,000 millions per c.cm., and the standard scheme was 4 doses at weekly intervals of 1 c.cm., 1.5 c.cm., 1.5 c.cm., and 3 c.cm. Some local soreness and induration resulted, but systemic reactions were slight or absent. The controls numbered 2,397, and observation was made over a period of forty-four months—March 1, 1934, to November 1, 1937. These 4,212 children were at risk for an average period of 13 months per child, 15 months in the vaccinated group and 11.6 months in the control group.

For any number of vaccinated children in a district a like number of controls were chosen in the same area, and as providing evidence of equality of exposure, both groups, we are told, had a very similar experience with such diseases as measles and scarlet fever.

The follow-up entailed 23,961 visits, or 5.7 visits per child at an average interval of 2.3 months. In 69 per cent. of the children in the vaccinated group, cough-plates were made in accepting the diagnosis of pertussis, and also in 67 per cent. of those in the control group. It is of considerable interest that, in those of the vaccinated group who contracted pertussis, cough-plates were positive in 6 per cent. as against 24 per cent. in the control group.

The results were impressive: 400 attacks occurred in all—namely, fifty-two in the vaccinated group and 348 in the control group. As to the type of attack, "severe" cases formed only 3.8 per cent. of the total in the vaccinated group. In the control group they constituted 13.1 per cent.

Statistically investigated in relation to exposure, the results showed that 12.8 per cent. of exposures in the vaccinated group were followed by pertussis, as compared with 68.5 per cent. in the control group. I may add that this investigation entailed the services not only of the Michigan Board of Health with its Bureau of Laboratories but also of the City Health Department of Grand Rapids, with its health officer and school physician. Local doctors helped in the immunization clinics, and assistance was given by nurses from the Bureau of Public Health Nursing of the City Health Department.

As a corollary to this field trial I would mention a most interesting experiment by Lawson (1939), who attempted to evaluate in mice the prophylactic value of various pertussis vaccines prepared from smooth, rough, and intermediate strains, the test of immunity being the capacity of the immunized mice to withstand an intratracheal injection of 0.05 c.cm. of a virulent culture calculated in the controls to produce a pertussis pneumonia. The results showed great differences in the immunity following vaccination with the various types: 92.6 per cent. survivals occurred among those vaccinated with the smooth strains, while those immunized with the intermediate and rough strains had only 30.8 per cent. and 7.1 per cent. survivals respectively.

One final study reported by Miller and Faber (1939) is worthy of note. This study on whooping-cough immunization was made at a baby clinic in California. Every month a number of infants less than 1 year old were vaccinated with pertussis vaccine given in three doses of 20,000 millions, 30,000 millions, and 30,000 millions at weekly intervals, while a similar number were selected by chance as controls. The vaccine was made from smooth Phase I organisms grown on Bordet-Gengou medium with human blood added. In all, 211 children were vaccinated and 182 acted as controls. All exposures

were carefully noted, and throughout an observation period of two and a half years there occurred among the test group twenty-six exposures which were followed by nineteen escapes, and among the controls twenty-five exposures with three escapes. The "communicability" rate among the vaccinated was therefore only 26.9 per cent., as against 88 per cent. among the controls.

Apart from the results achieved in these trials, which I can only sketch here, the mere reading of the records gives one a lively impression of the courage of the organizers and their determination to probe the possibilities of a method of prophylaxis against whooping-cough in spite of early failures by others, and to endeavour to find out to what factors, whether concerned with the vaccine and its administration or with the interpretation of the resulting data, such failures were most probably due. There is no doubt that a correct evaluation of the method can be made by an organization capable of observing as precisely as possible the exposures of the test and the control subjects and noting the proportion of escapes in the two groups.

Another problem arises here. The age at which a pre-school child, say 9 months, may be submitted to immunization against diphtheria is also the age at which this same child might very desirably be immunized against whooping-cough. What is to be done? I am not aware that diphtheria toxoid has so far been administered in combination with a pertussis vaccine, but I see no reason why this should not be attempted if Ramon's claim holds that the potency of diphtheria toxoid in mixture with T.A.B. vaccine is in no way interfered with and indeed appears to be enhanced. Such mixtures would first require to be tested on animals in which, at any rate, the rise in antitoxin titre can be accurately evaluated.

Before, however, we can embark seriously on well-planned crusades to prevent diphtheria and whooping-cough, one great stumbling-block has to be got rid of, and it is not the stumbling-block of general apathy. It is the stumbling-block occasioned by the fact that many large health authorities either cannot afford or are not sufficiently alive to the necessity for trained whole-time bacteriologists on their staffs capable of organizing and co-operating in such crusades. It is a short-sighted policy to which the Ministry of Health might well direct its attention, because, if persisted in, we cannot hope to keep pace in this country with the progress in preventive medicine registered elsewhere.

Scarlet Fever

With regard to scarlet fever, I think it is fair to say that even if a thoroughly dependable scheme of vaccination with the appropriate streptococcal toxin, the strength of which is measured in skin-test doses, could be recommended and put in practice, the mass immunization of children would not appear to be particularly urgent in view of the benign character of the malady in these days. In the United States the position is similar, and no active immunization against scarlet fever seems to be taking place, though both here and in that country much has been and still can be successfully done to protect nursing staffs and others in institutions. This limited application of the method of active prophylaxis has undoubtedly resulted in a reduced incidence of scarlet fever. A few months ago the Surgeon-General reported to the Office Internationale in Paris that active immunization against scarlet fever had made little progress in the United States, and he gave as reasons: (1) the benign character of the malady; (2) indecision as to the practical value of the method; and (3) the limitations imposed on production of the antigen by holders of the Dick patent. The decision of the Ministry of Health not to give its blessing to the practice of prophylactic immunization against scarlet fever, at least under present circumstances, would seem to be justified, and I do not propose to say anything more about it.

Measles

The possibility of preventing measles or of mitigating its attack by passive immunization of contacts with convalescent measles serum or, it may be, of adult serum, has been recognized for over twenty years, and the method has been practised extensively, but less perhaps with the object of preventing attack than of moderating possible attacks on weakly children who happen to be contacts. A considerable amount of success has been achieved in both directions, but there has been no widespread effort to secure and store the human sera necessary for more than a small proportion of contacts, so that, as a measure calculated to reduce epidemic incidence, it plays only a very minor part. It is unnecessary for me to enlarge on the technique and practice of the method, and I shall therefore content myself with referring briefly to certain difficulties and problems that have arisen in connexion with large-scale experience. In this country the London County Council has during the past decade devoted much attention to measles prophylaxis, and has published elaborate accounts and analyses of its experience both with convalescent and with adult sera. Gunn (1938) in a recent account of experiences during the London measles epidemic (1935–6) draws attention to the fact that there is no method of assaying beforehand the potency of a particular batch of human serum. It is probable, as he says, and as we know for certain in the case of convalescent poliomyelitis serum, that potency may vary greatly and may account for disappointing and anomalous results. Measles prophylaxis by the passive method cannot in his view be greatly extended in scope until immune serum is readily available at all times when required and until deliberate exposure is practised so that non-immunes may have the advantage of attenuation. This, as he says, can be justified only if the efficacy of the serum is proved beforehand and parents or guardians give their consent.

Dr. Gunn raises the question whether the possibilities of active prophylaxis, or of combined active and passive prophylaxis, may not reasonably be exploited further. To use for purposes of active prophylaxis infective material from measles in the early catarrhal stage, as some have on occasion done, would, I am afraid, be a dubious and impracticable expedient. We must wait for further knowledge of the infective agent of measles, and it is slow in coming. The stumbling-block in experimental research on measles has been the difficulty of transmitting the disease with certainty to any laboratory animal and carrying it on in passage. If this could be achieved we would be in a position not only to assay batches of convalescent or adult serum but also to explore the possibilities of active prophylaxis.

Influenza

Influenza, and by that I mean more specifically influenza as we know it in epidemic times, is now recognized to be a virus disease communicable to more than one laboratory animal and capable of being passaged with regularity in such, as well as in the embryo chick membranes. We are therefore in an excellent position to explore in man the possibilities of active prophylaxis, and

extensive research to this end is in progress in this and other countries. The position at the moment has been clearly stated by Andrewes (1939) in a recent paper. We now know that active or "living" virus when introduced subcutaneously or intraperitoneally in large doses can protect ferrets from contracting infection by contact and also inhibit the development of lung lesions, but that it does not usually protect them against a test dose of virus administered by the nasal route. When the inactivated virus is introduced subcutaneously in ferrets and mice it will immunize, though less effectively than the "living" virus. Fairbrother and Martin (1939) have shown that elementary-body suspensions obtained from pneumonic lungs of mice, when heated at 57° C., are highly satisfactory immunizing agents for mice when tested for immunity by the nasal route. Both "living" virus and inactivated virus, given subcutaneously to man, induce the development of specific virus-neutralizing antibodies in the blood serum.

One finding, however, which is likely to complicate the problem of active immunization as applied to man is the multiplicity of antigenic types among the strains recovered from different outbreaks of human influenza. These types do not differ so sharply from each other as do the pneumococcus types, but there would appear to be at least four main types, together with others, or master-strains, which contain in themselves most of the major antigens and react, therefore, with the immune sera evoked by all strains isolated from human influenza. The problem raised by this complication, and its bearing on immunization of man as a practical issue, has been dealt with by Dr. Stuart-Harris, who has had especial experience in this sphere of work. Fairbrother and his colleagues claim that these antigenic differences, which are brought to light by the use of the virus-neutralization test, cannot be detected when the complement-fixation test is used, and they suggest that the basic antigen may possibly be identical in all strains. Doubtless research on this problem will be continued with the intensity its importance demands, and we may reasonably hope that some really useful addition to our armamentarium against influenza may emerge.

Conclusion

To conclude, I have written almost entirely from the standpoint of one who has had little opportunity of observing at first hand the difficulties inevitably encountered in attempting to apply effectively results of laboratory research that can be guaranteed to reduce the incidence and mortality of certain of the diseases here discussed. I can appreciate these difficulties, however, and can only regret that what may be called the social impact of medical discovery in the field of prevention takes so long to fructify. In the field of treatment discoveries get across quickly enough, perhaps too quickly. When I reflect that, owing to ignorance, vested interest, or complacency in high places, a municipality is still prevented from ordering the pasteurization of all milk that comes into it, I sometimes despair of getting preventive science across. If a move was made to make diphtheria immunization compulsory, as it is now in Guernsey, we would be told, I suppose, that the Government cannot move in advance of public opinion. In reply I would say that the present time of national stress is rather a favourable one in which to change that policy, and to impose on people what is good for them if they are unable to realize what is good for themselves and their children. It may sound a totalitarian policy, if you like, but in essence it seems to me quite democratic, for it involves a negligible sacrifice on the part of the individual for his own and the common good.

Summary

A survey is made of the position with regard to control of the five infectious diseases by preventive inoculation.

The various diphtheria antigens are reviewed, together with the methods of administration appropriate to each.

The necessity for more intensive propaganda in favour of immunization against diphtheria is urged.

The subject of active immunization against whooping-cough is discussed, and studies of recent crusades abroad are given.

Prophylactic immunization against measles, scarlet fever, and influenza is briefly dealt with.

Bibliography

Andrewes, C. H. (1939). *Lancet*, **1**, 589.
Fairbrother, R. W., and Martin, A. E. (1939). *Arch. ges. Virusforsch.*, **1**, 114.
FitzGerald, J. G., Fraser, D. T., McKinnon, N. E., and Ross, Mary A. (1938). *Lancet*, **1**, 391.
Glenny, A. T., and Südmersen, H. J. (1921–2). *J. Hyg.*, **20**, 176.
—— Pope, C. G., Waddington, H., and Wallace, U. (1926). *J. Path. Bact.*, **29**, 31, Note 23.
Gunn, W. (1937–8). *Proc. roy. Soc. Med.*, **31**, 828.
Jones, F. G. (1938). *Amer. J. Hyg.*, **28**, 359.
Kendrick, P., and Eldering, G. (1939). Ibid., Sect. B., **29**, 133.
Lawson, G. McL. (1939). Ibid., Sect. B, **29**, 119.
Miller, J. J., jun., and Faber, H. K. (1939). *J. Amer. med. Ass.*, **112**, 1145.
Ramon, G. (1922). *C. r. Soc. Biol.*, **86**, 661, 813.
—— (1924). *Ann. Inst. Pasteur*, **38**, 1.
—— 1939). *Int. Clin.*, **1**, Ser. 2, 241.
—— (1939). *Presse méd.*, **47**, 405.
Volk, V. K., and Bunney, W. E. (1939). *Amer. J. publ. Hlth.*, **29**, 197.

OPHTHALMIC SERVICES TO THE CIVIL POPULATION IN NATIONAL EMERGENCY*

BY

Colonel A. IRVINE-FORTESCUE, D.S.O., M.B.

Special Certificate Civilian Anti-gas School, Easingwold

The subject of ophthalmic service in national emergency is a very wide one, and I propose to restrict my paper to an attempt to describe the conditions under which ophthalmologists will have to work in such an emergency. We have all heard many lectures and read numerous articles on conditions in Britain during the next war. Much that has been spoken and written on the difficulties we shall have to face in the event of hostilities strikes one as academic and unreal because of the lack of concrete examples and of descriptions of actual events.

The civil war which broke out in Spain in July, 1936, has afforded most interesting and instructive lessons in the effects of air raids on large cities. Since over 80 per cent. of the population of Britain is urban and approximately one-fifth of our people inhabit Greater London, it is obvious that the problem of defence against enemy attack from the air is a matter which chiefly concerns the town dweller. The city of Barcelona, with a population approximately equal to that of Glasgow, was frequently bombed from the air during 1937 and 1938. The

* Read in opening a discussion in the Section of Ophthalmology at the Annual Meeting of the British Medical Association, Aberdeen, July, 1939.

most intensive bombing was on March 16, 17, and 18 last year. During these three days there were thirteen air raids. According to figures obtained from the local authorities by Mr. Langdon-Davies and published in his book *Air Raid*, the resulting casualties were 3,000 killed, 5,000 hospital cases, and 20,000 minor injuries. Statistics obtained by Major N. D. MacRoberts and published in his *A.R.P. Lessons from Barcelona* show that forty-eight large buildings were totally destroyed and 100 buildings, including sixteen theatres and cinemas, were partially ruined. Many streets were completely blocked with debris and remained impassable for days.

What an Air Raid Means

A good way of grasping what an air raid actually means is to read the official diary of a typical raid recorded at the time by A.R.P. headquarters at Barcelona and reproduced by Mr. Langdon-Davies. The diary runs as follows:

March 17, 1.58 p.m.—Orders received to sound air raid alarm signal.

1.59 p.m.—Presence of five enemy planes reported.

2 p.m.—Calls for ambulances received from eight different points.

2.31 p.m.—Delayed reports received from three further points.

3.50 p.m.—A serious fire is reported.

7.30 p.m.—Casualties in last raid reported as follows: one hospital, 80 dead and 229 wounded; another hospital, 335 dead and 350 wounded. Total, 415 dead and 579 wounded. A large number of casualties were still being dug out of the ruins.

This diary shows that a raid may take place without warning and that many hundreds of casualties may occur in a few moments.

It has not been possible to obtain statistics showing the proportion of eye injuries to total casualties in the air raids on Barcelona, but as a working estimate we may take 5 per cent. total wounded as having eye injuries of some sort. This would give thirty eye casualties admitted to hospital for the above raid and over 1,000 eye cases for the three days of fairly intensive bombing. Authorities appear to be convinced that in the next war the large towns of Britain will be much more intensively bombed than ever Barcelona was. We may therefore expect many more casualties per raid—three to four times the Barcelona figures, say 100 to 150 eye cases in a single raid without gas.

German bombing aircraft can carry over 4,000 lb. of bombs and have a radius of over 1,000 miles, so that no town in Britain can reckon itself safe. It is usual for bombs to be dropped in salvos from groups of aircraft. In the Barcelona case above referred to the group of machines numbered five, but this number may be largely increased.

The Effects of Aircraft Bombs

Aircraft bombs are of three kinds: (1) high explosive, (2) incendiary, (3) gas. In Spain high explosive bombs were the most frequently used and caused by far the greater part of the damage.

HIGH-EXPLOSIVE BOMBS

High-explosive bombs act by fragmentation, blast, and penetration. Pieces of the shell may cause wounds, the violent disturbance of the air set up by the explosive destroys buildings, and casualties are caused by falling masonry and material; or the bomb may penetrate a building and burst in the interior, producing a maximum destructive effect. When a high-explosive bomb bursts in a street there is first a pushing inward of all windows and doors opening on the street in which the bomb fell, and, secondly, a suction action which pulls the fronts of entire blocks into the roadway. These effects are produced up to a radius of 100 to 200 yards from the site of the explosion. It is easy to imagine how large numbers of casualties may occur from the collapse of buildings in this way.

INCENDIARY BOMBS

These bombs are much smaller than high-explosive bombs. The most effective weight appears to be about 2 lb., and thus very great numbers can be carried—1,000 to 2,000 by a single bomber. Experience in Spain shows that a large proportion of incendiary bombs dropped fail to produce fires, but supposing that only one in five was effective, the cargo of one bomber might produce 200 to 400 fires, and for a formation of fifteen to twenty planes these figures would be proportionally increased. We may therefore expect more fires than can be dealt with by the fire service and large numbers of casualties due to burns.

GAS BOMBS AND GAS SPRAY

A discussion of the use and effect of gas bombs is somewhat academic, as such bombs have not been used in Spain and China. But phosgene and mustard can be enclosed in bombs, and mustard can be distributed in the form of spray from the undercarriage of a plane. Also we know that during the great war gas was responsible for 180,000 casualties and 6,000 deaths among the British troops. It is believed that large quantities of phosgene and mustard bombs are being manufactured by certain powers. Aerial attack by gas bombs is therefore a possibility for which we must be prepared.

The gas which chiefly concerns the ophthalmologist is mustard, on account of the serious eye lesions produced by this substance. The lacrimator gases are unimportant from an ophthalmic point of view as their effects pass off in a few hours after the removal of the victim from the gas-charged atmosphere, without special treatment. Mustard, however, is extremely important. The crater of a mustard bomb gives off toxic vapour for days and even weeks; the action of the gas on the body is insidious, no symptoms usually being observed for two or more hours after exposure, and the resulting eye conditions are serious. Aerial bombs are peculiarly suited for the distribution of mustard. More than half the total weight of the bomb is accounted for by the gas content. A 50-lb. bomb will hold 17½ pints of liquid mustard. Further, a gas bomb has little tendency to bury itself, and most of its contents are spread over the ground. The most effective size of mustard bomb is either 50 lb. or 100 lb., and one bomber can carry sixty or more 50-lb. and thirty or more 100-lb. bombs. A 50-lb. bomb will contaminate an area of 360 square yards sufficiently to make a casualty of any unprotected person who enters this area for some days after the burst.

Continental authorities advocate aerial bomb attacks in successive waves of different kinds of bombs: first wave, high explosive; second wave, incendiary; third wave, mustard. The high-explosive bombs will destroy buildings and burst gas and water mains. The incendiary bombs will set fire to the ruins, aided by escaping gas and lack of water. The mustard will hamper the movements of first-aid and demolition parties.

Spray Attacks.—Mustard can be distributed in fine droplets projected from containers suspended from the undercarriage of a bombing plane. Mustard spray may be released from planes at a height so great that these are neither seen nor heard, so that the gas attack may come as a complete surprise, exposed persons having no time to put on their respirators before the mustard spray reaches them.

From the foregoing summary of the nature of aerial bomb attacks it is obvious that we should be prepared for large numbers of eye casualties occurring suddenly and with little or no warning. These casualties will fall into

three classes: (1) effects of high explosives, such as concussion injuries and wounds, with or without a foreign body in the globe; (2) effects of incendiary bombs—namely, burns; (3) effects of mustard gas such as conjunctivitis and corneal ulceration.

Organization of Casualty Services

To provide for the numerous casualties that may be expected in the event of air raids local authorities throughout the country are arranging a system of collection, evacuation, and accommodation which will ensure that every victim of enemy action receives appropriate treatment at the earliest possible moment. When casualties are reported by the air raid warden service, first-aid parties of stretcher-bearers with ambulance cars will proceed to the spot indicated and guide or convey casualties to a first-aid post, where first-aid treatment will be rendered (and emergency operations performed). From the first-aid post light cases will be sent home, while cases requiring hospital treatment will be conveyed by ambulance car to a casualty clearing hospital, where urgent operative procedures will be carried out and cases reclassified into those requiring prolonged hospital treatment and those likely to be discharged in twenty-four or forty-eight hours. Cases needing prolonged hospital treatment will be evacuated by ambulance car to base hospitals situated in comparatively safe areas. Cases likely to be fit for discharge in a day or two may be retained in the clearing hospital if circumstances permit.

To supplement the organization of fixed first-aid posts there will be in every large town, and also in certain rural areas, mobile first-aid units. A mobile first-aid unit is to consist of a medical officer, a trained nurse, and eighteen women nursing auxiliaries, the latter arranged in three shifts of six each. A scale of drugs, dressings, splints, surgical instruments and utensils, and heating and lighting equipment sufficient for 250 casualties has been drawn up by the Home Office. The articles are packed in a series of portable cupboards made up on the expanding bookcase plan. The medical officer, the trained nurse, and the equipment are to be carried in a large motor vehicle, and the auxiliary nursing personnel in a second vehicle. It is intended that the mobile unit should be stationed at a hospital provided that this is not in a congested area. Where it is not practicable to have the unit at a hospital it will be located at a convenient centre on the outskirts of a vulnerable area. When an air raid occurs the mobile unit will proceed to the principal casualty area and open in any convenient building or in the open air. It is not proposed that first aid should be rendered inside vehicles. Mobile units of this type have been found most useful in Barcelona and Madrid.

It would appear that the provision of mobile first-aid units is a matter of vital importance and one which should receive the active support of all members of the British Medical Association. The provision of suitable vehicles with the necessary cupboards will involve considerable capital expenditure, which local authorities will often be reluctant to incur. Judging by the casualty figures in Barcelona, the allowance of dressings, drugs, and utensils for only 250 initial casualties per unit would appear to be hardly adequate. In the published list of equipment only two eye baths and one two-pint irrigator are allowed per mobile unit and also per fixed first-aid post.

I have tried to show why we may expect large numbers of eye casualties to occur suddenly, and I outlined the general medical arrangements by which it is proposed to deal with these casualties. I suggest that, to ensure uniformity of procedure and to maintain a high average standard in dealing with eye cases throughout the 200 or so local authorities in Britain, each of whom has its own scheme of casualty service, a system of consulting ophthalmic surgeons and ophthalmic centres should be organized on the lines adopted by the Army Medical Department in the great war. Under this system there was a Consulting Ophthalmic Surgeon to the Forces, who exercised a general supervision and direction over all ophthalmic work. Next there were Army and Command Consultants, who supervised work in limited areas. Finally in each army over-seas and at each command at home there were one or more ophthalmic centres attached to general and base hospitals in which eye casualties were collected and treated. I submit that only by some such centralized supervision and regulation in a period of air attacks on Britain can the best results be ensured for eye casualties among the civil population.

Conclusion

Let me here add a few words about a personal experience of a mustard gas attack and of the deductions to be drawn therefrom. On July 22, 1917, I was in command of a field ambulance stationed on the Belgian coast near La Panne. Within twenty-four hours I had to admit nearly 2,000 mustard gas casualties. The great majority of these were completely blind. Although roughly 80 per cent. were fit for duty again in a fortnight, all were hospital cases for the time being. It was essential to treat as many cases as possible simultaneously, and to expand my bed accommodation rapidly. As the result of my experience I would strongly urge upon all Association members interested in eye work that they should agitate for the provision in their respective areas of the following: (1) A supply of marquees sufficient to allow of existing hospital accommodation being rapidly increased. (2) A supply of auxiliary nursing personnel specially trained in eye irrigation. (3) A sufficient supply of irrigators to allow of a considerable number of mustard eye casualties being treated simultaneously.

Summary

This paper is an attempt to describe the conditions under which ophthalmologists will have to work on the home front in war time.

The number of eye casualties we would have to expect, based on the example of the civil war in Spain, is discussed.

The results of the use of the various kinds of aerial bomb, and particularly of mustard gas bombs and mustard gas spray, are reviewed.

A suggestion is made as to the general arrangements by which to deal with eye casualties.

Glucose Tolerance and Acid-base Equilibrium.—The literature relating to disturbances of carbohydrate metabolism found in patients suffering from some mental disorders and to disturbances of the acid-base equilibrium, also stated to be present in some psychotics, is reviewed. Experiments are reported which were designed to show the presence or absence of correlation between the two disturbances. Results of the investigation were negative, no such correlation being found. It is therefore concluded that changes in acid-base equilibrium are not responsible for the alterations in carbohydrate tolerance.—Disturbances of Glucose Tolerance and of Acid-base Equilibrium in Manic-depressive Insanity. J. K. Marshall. —*J. ment. Sci.* March, 1939, **85**, 222.

TRANSFUSION WITH STORED BLOOD

BY

J. C. LEEDHAM-GREEN, F.R.C.S.

Honorary Assistant Surgeon, North Staffordshire Royal Infirmary; late Resident Surgical Officer, General Hospital, Birmingham.

Although reports of the value of stored blood for transfusion purposes have been published recently by Biddle and Langley (1939), Elliott, Macfarlane, and Vaughan (1939), Vaughan (1939), and other writers, its widespread adoption has not yet followed. The advantages of a ready supply of stored blood are manifest and have been sufficiently emphasized by the authors I have named. From my own experience during the last twelve months I can echo their enthusiastic reports. There is, moreover, one advantage of stored over fresh blood to which, so far as I am aware, no reference has been made, and that is the diminished risk of transmitting syphilis. According to Neisser (1914) the *Treponema pallidum* loses its virulence after twenty hours in an ice-chest.

Collecting and Storing the Blood

Complicated and expensive apparatus is not needed for collecting or storing the blood. The one essential is that the blood should be withdrawn with every aseptic precaution into a *closed* bottle, and the purpose of this communication is to give my experience with sixty transfusions of stored blood at the General Hospital, Birmingham, using the method of collecting blood described by Marriott and Kekwick (1935). The donors were all members of the Birmingham Blood Transfusion Service, and were either Group II or Group IV (Moss). There is no need to enlarge on Marriott and Kekwick's method of bleeding donors, for they have described it fully. The blood is collected in a graduated quart milk bottle in which a negative pressure is maintained by means of a Dunlop foot-pump in which the valve has been reversed. If such a pump is not available a Potain's aspirator will serve the purpose. The average amount of blood collected from each donor was 600 c.cm., and this was mixed with 100 c.cm. of 3.8 per cent. sodium citrate solution.

After the blood had been collected the bottle was sealed with a plug of sterile cotton-wool round which a layer of gauze had been wrapped to prevent the wool from sticking to the neck of the bottle. A test tube with a few drops of the donor's blood in citrate solution for the cross-agglutination test between the donor's corpuscles and the recipient's serum was attached to the bottle with a rubber band. Finally the bottle was labelled with the date on which the blood had been taken and the group, and immediately conveyed to a refrigerator which maintained a temperature of about 4° C.

The Present Series

Fifty-three donors were bled and sixty transfusions given. In several cases two transfusions were given from blood collected from one donor. One bottle was discarded on account of excessive haemolysis. The average length of time the blood was kept before it was used was 5.5 days. The longest period was twenty-eight days, and no reaction followed the transfusion of this blood. The average length of time the blood had been kept in those cases showing reactions was four days. The blood was given by the gravity method, and in one case by means of Marriott and Kekwick's drip-transfusion apparatus.

Reactions

Reactions were observed in twelve cases, as follows: severe rigors, one case; slight rigor or shivering attack, eight cases; pyrexia, three cases. There were no instances of jaundice or haemoglobinuria. The reactions were equally divided among the patients of Group II and Group IV. In four of these cases it is not improbable that other factors besides the blood were responsible.

Case 1.—A patient with microcytic anaemia developed a slight rigor eleven hours after the transfusion.

Case 2.—A man who had been transfused after a perineo-abdominal excision of the rectum developed a rigor, but at the time of the rigor was actually on an intravenous glucose "drip."

Case 3.—A man with a bleeding peptic ulcer showed a rise in temperature to 101° twelve hours after transfusion.

Case 4.—A boy of 15 with leukaemia developed a temperature of 101.4° after transfusion.

In the last case the blood had been transfused a few hours after it had been taken. Blood from the same bottle was given three days later to another patient without any reaction developing. In the last two of these cases it is just as likely that the rise of temperature was a natural feature of the disease as that it was an effect of the transfusion. If these two be excluded from the twelve cases which showed a reaction we are left with ten, giving a reaction rate of 16.6 per cent. This rate is almost identical with that found by Vaughan (1939) in fifty consecutive transfusions with stored blood at the British Postgraduate Medical School. Although I have no figures for comparison I have an impression that this reaction rate is no higher than after the transfusion of fresh blood, and the various ward sisters are of the same opinion.

Haemolysis which is apparent to the naked eye usually starts after the blood has been stored from ten to fourteen days, but may appear much earlier if there has been difficulty in securing a rapid even flow from the donor, if clot is present, or if the blood has been taken out of the refrigerator and allowed to get warm in anticipation of a transfusion and then returned to the refrigerator. Blood in which the supernatant plasma has turned red should be discarded, and, as stated, one bottle was discarded for this reason; but a slight degree of haemolysis does not appear to give rise to any unpleasant sequelae. Routine bacteriological tests were not carried out, but occasional samples were cultured and were always found free from microbic contamination.

It is my pleasure to express thanks to the medical and surgical staffs of the General Hospital, Birmingham, for free access to their cases, and to Dr. W. T. Hillier for the bacteriological examinations and much friendly advice. I owe a special debt of gratitude to numerous donors and to Mr. H. E. Cooper, the honorary secretary of the Birmingham Transfusion Service. His friendly co-operation made this work possible.

References

Biddle, E., and Langley, G. F. (1939). *British Medical Journal*, **1**, 555.
Elliott, G. A., Macfarlane, R. G., and Vaughan, J. M. (1939). *Lancet*, **1**, 384.
Marriott, H. L., and Kekwick, A. (1935). Ibid., **2**, 78.
Neisser (1914). Quoted by Wolff and Mulzer, *Lehrbuch der Haut und Geschlechtskrankheiten*, **1**, 201, Stuttgart.
Vaughan, J. M. (1939). *British Medical Journal*, **1**, 933.

Cryptorchidism.—In 314 out of 544 cases of cryptorchidism spontaneous descent occurred; 217 patients were not followed up. Descent occurred between the ages of 7 to 17 years, most commonly between 11 and 14 years.—Cryptorchidism. W. W. Johnson.—*J. Amer. med. Ass.*, July 1, 1939, **113**, 25.

CHOICE AND PREPARATION OF BLOOD-GROUPING SERA FOR EMERGENCY PURPOSES

BY

S. W. CHALLINOR, Ph.D., B.Sc., A.I.C.

J. C. J. IVES, M.B., Ch.B.

AND

C. E. van ROOYEN, M.D.

(*From the Department of Bacteriology, University of Edinburgh*)

During the past few weeks we have been confronted with the problem of supplying relatively large quantities of human typing sera at a few hours' notice, and the purpose of this paper is to record the methods we employed, in the hope that they may be of help to others faced with the same situation.

The selection of the typed volunteers constituted our first problem, and this was accomplished with the aid of a small quantity of blood-grouping sera* of Group II (Moss)—that is, international classification A; and Group III (Moss)—that is, international classification B. With these a number of human volunteers were duly typed. (For the remainder of this paper we have adopted the Moss classification.) From these individuals four of Group II and four of Group III were chosen for tests, the object of the experiments being to find out which of them could provide the most active sera for standard typing purposes. In order to obtain this information it was decided to set up a series of increasing dilutions of each individual's serum, to which was added a suspension of red blood cells. In this way it was possible, first, to determine which of the sera produced clumping in the highest dilution, and, secondly, to ascertain the character and nature of the clumping produced. The results of our experiments showed that the serum possessing the highest end-titre of agglutinins was not necessarily the serum of choice for typing purposes, since we observed that the qualitative character of the reaction—for example, the size and appearance of the clumps as seen by the naked eye—was a better criterion of the value of sera for typing work than the end-titre at which the reaction occurred. We wish to point out that some sera give agglutination reactions that are easily visible to the naked eye, whereas with others such reactions are not so marked and the time taken for agglutination is longer. It is desirable to add a preservative to typing serum, and of the two most suitable reagents, phenol and glycerol, we decided to use phenol in order to avoid excessive dilution of the serum. For a comprehensive account of human blood groups the reader is referred to the monograph of Dawood Matta (1937). Details of the experimental methods employed by us are as follows.

* Burroughs Wellcome and Co., London.

Collection of Blood

Ten c.cm. of blood was removed from each of four Group II donors, was allowed to clot overnight in the ice-chest, and was separated from the sides of the test tube with a platinum wire and centrifuged; the serum was then separated. From one of this same group a further 10 c.cm. of blood was withdrawn, added to 10 c.cm. of 3.2 per cent. sodium citrate solution, centrifuged, the deposited corpuscles washed thrice in physiological saline, and 100 c.cm. of a 1 per cent. suspension in saline of these cells prepared. There was now available (1) about 3 c.cm. of serum from four different Group II donors, and (2) 100 c.cm. of a 1 per cent. saline suspension of washed Group II corpuscles. Exactly the same procedure was adopted with regard to the four Group III donors, so that four specimens of Group III serum—that is, containing agglutinin α—were available, together with one specimen of Group III corpuscles—that is, containing agglutinogen B.

Technique of Titration Test

For the testing of each serum eleven Wassermann tubes were placed in a rack and 0.4 c.cm. of saline was added to tubes Nos. 2 to 11 inclusive. To the first and second tubes 0.4 c.cm. of serum (from the first donor to be tested) was added. From tube No. 2, 0.4 c.cm. of the diluted serum was transferred to tube No. 3, and from this tube the process was repeated until tube No. 10 was reached, from which 0.4 c.cm. was discarded. The serum dilutions of No. 1 donor were thus as follows: 0.4 c.cm. of undiluted serum in the first tube, 0.4 c.cm. of 1:2 serum in tube No. 2, 1:4 in No. 3, and so on with the highest dilution of 1:512 in tube No. 10. Tube No. 11 contained only 0.4 c.cm. of saline and constituted the control. Red blood corpuscles of Group III were next added (0.4 c.cm. of a 1 per cent. suspension in saline to each tube), so that each dilution of serum became doubled, and thus tube No. 1 contained a final dilution of serum diluted 1:2, and tube No. 10 a dilution of 1:1024. The control tube now consisted of a mixture of normal saline and red blood cells. The test tubes were then incubated at 37° C. for one hour; at the end of that time a preliminary examination of the tubes was made with the aid of a hand lens, following which the tubes were allowed to stand overnight on the

Final Serum Dilution (against Group III Corpuscles)

	1	2	3	4	5	6	7	8	9	10	11
Group II Serum	1 : 2	1 : 4	1 : 8	1 : 16	1 : 32	1 : 64	1 : 128	1 : 256	1 : 512	1 : 1024	Control
Donor 1	+++	+++	+++	+++	+++	++	−	−	−	−	−
„ 2	+++	+++	+++	++	+	−	−	−	−	−	−
„ 3	++++	+++	+++	+++	+++	++	+	−	−	−	−
„ 4	+++	+++	+++	+++	+++	++	+	±	−	−	−

Final Serum Dilution (against Group II Corpuscles)

	1	2	3	4	5	6	7	8	9	10	11
Group III Serum	1 : 2	1 : 4	1 : 8	1 : 16	1 : 32	1 : 64	1 : 128	1 : 256	1 : 512	1 : 1024	Control
Donor 5	+++	+++	+++	+++	++	+	+	±	±	−	−
„ 6	++++	+++	+++	+++	++	+	+	±	−	−	−
„ 7	+++	+++	+++	+++	+++	++	+	±	−	−	−
„ 8	+++	++	++	++	++	++	++	+	±	−	−

NOTE.—The sign + indicates agglutination.

laboratory bench at room temperature, being subjected to a final reading in the morning (after eighteen hours).

This method of testing serum (No. 1) for haemagglutinating properties was repeated in the case of the other three sera (of Group II). In actual practice it was our procedure to set up all the serum dilutions simultaneously, add corpuscles of Group III to the four Group II sera and corpuscles of Group II to the four Group III sera, incubate the test tubes together, and interpret all the results, first at the completion of one hour and later at the end of eighteen hours. The table indicates the results obtained.

From the foregoing table the following definite fact can be observed—namely, that each of the diluted sera tested gave approximately the same end-agglutination titre (approximately 1 : 128 for serum of Group III Moss). We wish to point out that human sera possess different agglutinin end-titres, but in the present work the ones used happened to have approximately equal end-titres; also, in each group variations are found in the degree of agglutination given by different corpuscles with the same serum. It was seen, too, that each of the four sera showed a dilution at which optimum agglutination occurred. As already stated, in addition to these quantitative observations there were definite qualitative differences in the nature and size of the clumping which enabled us to select certain of these sera as being the most suitable for the purpose of blood grouping.

Storage of Serum

Having chosen the two most suitable donors from each of Groups II and III, half to three-quarters of a pint of blood was withdrawn from each donor into sterile pint bottles and allowed to stand overnight in the ice-chest. During this preliminary storage the absorption of any "cold" agglutinins takes place. The separated serum was transferred by means of sterile pipettes into sterile 100 c.cm. bottles. In order to maintain sterility phenol (5 per cent. aqueous solution) was then added to the serum so that the phenol concentration was 0.5 per cent. For distribution purposes the phenolized serum was transferred in 1 c.cm. quantities to sterile phials fitted with rubber bungs, which were afterwards waxed.

Use of Desiccated Serum

An alternative method for the preservation of typing sera which we used was that employed earlier by Craigie (1931) and Craigie and Tulloch (1931) for the preservation of sera by exsiccation *in vacuo* from the frozen state. Using this method, it is possible to dry rapidly in a desiccator over $CaCl_2$ large quantities of serum. The final product, which assumes the character of a dry brown flaky powder, can be stored in the ice-chest for an indefinite length of time without fear of contamination or significant loss of agglutinating properties. On account of its hygroscopic nature the container should be sealed or well stoppered. The only disadvantage of the use of dried serum is that larger quantities are required than of the fluid serum; but this disadvantage is offset by the fact that desiccated serum is easily distributed and handled, and, in any case, the actual amount of dried serum needed for a typing test is exceedingly small.

When it is desired to make a quantity of serum from dried material it is necessary to reconstitute the dried serum to the original bulk by the addition of sterile distilled water; thus if 5 c.cm. of serum were desiccated to a dry powder, 5 c.cm. of water should be added to it in order to restore its original consistency.

Technique of Typing Test

For typing human serum we have employed the standard macroscopic procedure of the London Blood Transfusion Service. Briefly, this was performed by placing two large drops of typing sera of Groups II and III respectively on a glass plate, to each of which was added *one small* drop of blood obtained from a finger-prick, care being taken to see that only enough blood was added to colour the mixture light pink, but not deep red. After thoroughly mixing the blood and serum by agitating the plate, the results were usually evident in one to two minutes. The use of a hand lens was occasionally of assistance in interpreting the phenomena, but, in general, neither a hand lens nor a microscope was required.

Technique of Test employing Dried Serum

A few small flakes (one bacteriological loopful) of dried serum of each of Groups II and III were placed on a glass plate; a large drop of water was added to each and the serum allowed to dissolve by gentle mixing. The subsequent stages of the test were performed in the same manner as in the case of fluid serum.

Conclusions and Summary

From our observations we conclude that the selection of suitable blood intended for the purpose of providing standard human blood-grouping sera should be assessed in two ways: (1) according to the end-titre of agglutinins; (2) by considering also the character and size of the clumps produced after a given length of time.

The use of desiccated typing sera is described and its merits for war-time work emphasized.

We wish to record our thanks to the Edinburgh Blood Transfusion Emergency Service for help in withdrawing the blood from the donors selected by us, and to Professor C. H. Browning for his interest and valuable advice.

References

Matta, D. (1937). "A Critical Investigation of the Blood Groups," Egyptian University, Faculty of Medicine, Publication No. 11, Cairo.

Craigie, J. (1931). *Brit. J. exp. Path.*, **12**, 75.

—— and Tulloch, W. J. (1931). Med. Res. Cncl. Sp. Rep. Ser., No. 156, London.

A quarterly court of the directors of the Society for Relief of Widows and Orphans of Medical Men was held on October 11, with Mr. V. Warren Low, president, in the chair. The deaths of a member and two of the widows in receipt of grants were reported. One of the widows had been in receipt of grants for the past thirty-four years and had received £3,500 from the society. Her husband, who was elected a member in 1868, had paid £52 10s. in subscriptions. The audited accounts for the half-year ended June 30 were presented and passed. During that period £2,242 10s. had been distributed among the sixty-two widows and four orphans on the books of the society. A widow of a member applied for relief, and was granted £60 yearly. The grants in January, 1940, will total £2,152. Owing to the increase in income tax the directors will not be able to make a Christmas present this year although the amount of income tax is returned, as the reclaim is not paid until about the middle of April in each year. Membership of the society is open to any registered medical man who at the time of his election is resident within a twenty-mile radius of Charing Cross. Relief is granted only to widows and orphans of deceased members, and they must be in necessitous circumstances. Full particulars may be obtained from the secretary of the society, 11, Chandos Street, Cavendish Square, W.1.

SEVERE UTERINE INERTIA TREATED BY CUTTING THE CERVIX

BY

J. V. O'SULLIVAN, M.D., F.R.C.S., M.R.C.P.

Assistant Obstetric Surgeon, City of London Maternity Hospital and Queen Mary's Hospital, Stratford; Consulting Obstetrician and Gynaecologist, Kingston and District Hospital; Obstetric Surgeon, Bearsted Memorial Hospital

Severe uterine inertia is one of the most difficult problems of midwifery. I think inertia should be divided into primary and secondary types; primary where no cause for the inertia can be found, and secondary where a definite cause—for example, disproportion or rigid cervix—is present. Most doctors are acquainted with the course of a severe case of inertia. The labour often starts with early rupture of the membranes. Uterine contractions remain weak and irregular for two or three days, during which time the liquor drains away. The cervix is slowly taken up, but does not dilate to more than two to three fingers. The head is by now deeply engaged in the cavity, and the cervix, which looks normal and caps the head, can often be seen by parting the labia and looking into the vagina. The uterus still relaxes well between pains, and the mother and foetus are still fit, but about this stage the patient has a tendency to bear down with pains. From now on she often complains of pain in the sacral region and sometimes behind the pubis, due probably to pulling on the utero-sacral and pubo-cervical ligaments as the cervix descends in front of the head. The patient, in short, seems to be trying to pass her uterus. Next a caput begins to form through the os, and soon meconium appears. During the following twenty-four hours or so the uterus relaxes less well and becomes tender to palpation; the foetal distress increases, while maternal distress, as seen by vomiting, rising pulse rate, and temperature, appears. The liquor becomes foul-smelling, and about this time the foetus usually dies *in utero*. The soft macerated head gradually bulges through the undilated cervix, forcing it open, and eventually by help of the obstetrician a macerated foetus is delivered. Perforation is usually necessary, and great difficulty is experienced in crowning the head and delivering the body because of the active retention of the foetus by the uterus (Holland). A morbid puerperium, with sloughing of the perineum, is the rule.

I was led to try the effect of cutting the cervix laterally for these unhappy patients by observing cases in which the cervix was buttonholed through either the anterior or posterior lip, and particularly two cases in which the cervix completely sloughed off and came away on the foetal head during the delay in labour. The site of the incision was largely determined by the fact that in many normal deliveries the cervix, as is well known, tears laterally. I first treated severe inertia cases, which had resisted medical treatment, by slow continuous or repeated manual dilatation of the cervix, by weight traction through Willett's scalp forceps, or, if the foetus was dead, by perforation followed by weight traction. I have also cut the cervix in front and behind, and immediately delivered the foetus by forceps if alive, and by perforation if dead, and then sutured the cervix. I was not satisfied with any of these procedures, so ultimately adopted the method which I propose to describe in this article.

Technique

The operation is simple, and can be done in a few minutes under any light anaesthesia, or even with Minnitt's gas-and-air analgesia machine. Two fingers are inserted into the cervix, one outside and one inside, to guard the side wall of the vagina and the foetal head respectively, and the cervix snipped with blunt-pointed scissors, usually at the lateral angles (roughly corresponding in position to 9 and 3 of the clock dial), which are already thinner than the rest of the cervix and often beginning to tear spontaneously. If the operator wishes a Sims duck-bill speculum can be passed and the cutting done under direct vision. The incision should not extend more than half an inch from the edge of the cervix, and should be preceded and followed by a hot antiseptic douche. Two incisions only should be made, one at each side. The cervix, after cutting, should be pushed gently up over the front of the head. The opportunity should be taken of stretching the vagina and ironing out the perineum. The patient is now allowed to come out of the anaesthetic.

Before this operation is attempted the usual methods of treating such cases should have been tried—for example, sedatives, hormone therapy (Jeffcoate), and a full medical induction. The head should be deeply engaged, the cervix taken up, thin, and capping the foetal head, and the membranes ruptured. If these points are observed the loss of blood is negligible—only a few drachms. The cervix should not be cut if it is oedematous or thick. I do not suture the cervix after delivery because with the small incision it is not needed and further tearing is slight. Patients in whom contractions are regular but half-hourly and advance is very slow, and in whom low sacral ache and retropubic pains develop, are immediately relieved of these pains, and labour ends rapidly and spontaneously. Where contractions are very irregular and weak labour is slower in ending, and sometimes a low forceps operation is necessary in the second stage.

There is another point I should like to stress particularly, and that is that morphine should never be given as routine to these patients: potassium bromide and chloral, 40 grains of each orally or rectally, or paraldehyde, 8 drachms rectally, act excellently. These drugs should be given alternately, preferably at night. The patient should also be encouraged to sit up as much as possible by day and should be given plenty of fluids and carbohydrates. When vomiting is troublesome a rectal or intravenous glucose saline should be administered.

Results

Patients needing this operation are rare, so I have been able to collect only fourteen cases in three years, one in private and twelve in hospital practice, out of about 9,000 to 10,000 deliveries which came under my supervision. It will be seen, however, from the analysis that in suitable cases the operation is highly successful. The cervices, when examined either during the puerperium or at post-natal visits, showed a transverse laceration, no worse in five cases than the cervix after many normal labours. In the others the transverse slit was well marked, but in no case did it involve the whole portio vaginalis. One of these women has had two normal labours and one miscarriage at four months since the operation.

I have included in this series one case in which marked foetal distress, as shown by meconium in large quantities and a foetal heart rate of 90 to 100 between pains, developed when the os was three fingers dilated. The pains were strong and regular. I cut the cervix as

described, stretched the vagina, and ironed out the perineum under light anaesthesia. The baby was born, alive and well, one hour later.

Case 1.—Emergency. Aged 18; primipara. No disproportion. No toxaemia. Spontaneous onset; membranes ruptured seven hours after. Pains weak but regular. Sedatives given. Os still only three fingers after sixty-one hours. Cervix cut as described. 7½-lb. baby born spontaneously 2 hours 20 minutes later. Excellent result. Mother and baby satisfactory. Cervix healed.

Case 2.—Booked case. Aged 24; primipara. Full term. No disproportion. No toxaemia. Spontaneous onset; membranes ? ruptured on admission. Pains regular. Much pain in lower sacrum. Sedatives given. After seventy-one hours os three fingers only; cervix taken up; liquor scanty. Cervix cut. 7¼-lb. baby born spontaneously three hours later. Excellent result. Mother and baby satisfactory.

Case 3.—Booked case. Aged 31; primipara. Full term. No disproportion. Mild toxaemia. Medical induction, as no pain and membranes ruptured. Pains irregular and weak. After fifty-two hours os three fingers only; liquor became scanty, green, and offensive. Sedatives and stilboestrol tablets given with no effect. Cervix incised under gas and air. Baby born spontaneously, in blue asphyxia, fifteen hours later. Good result. Cervix healed at end of puerperium. Mother and baby did well.

Case 4.—Booked. Aged 30; primipara. Full term. No disproportion. Oedema of legs only. Spontaneous onset, membranes ruptured before labour started. Pains week. early maternal distress. Sedatives and medical induction given. After forty-eight hours os still only two fingers. Cervix cut. Baby born twenty-two hours later; head lifted over perineum after two hours in second stage. Baby 8½ lb. Good result. Mother and baby satisfactory.

Case 5.—Emergency. Aged 21; primipara. Full term. No disproportion. No toxaemia. Spontaneous onset, membranes ruptured after sixty hours. Pains regular. Sedatives, stilboestrol, prontosil, glucose, etc., given. After 130 hours os still three fingers; much meconium. Cervix incised under gas and air. 10¼-lb. baby born seven hours later. Delivered by forceps because of maternal and foetal distress. Very good case. At post-natal examination condition satisfactory; cervix showed slits no worse than many normal labours.

Case 6.—Booked, private. Aged 21; primipara. Full term. No disproportion. No toxaemia. Spontaneous onset; membranes ruptured twenty-four hours later. Pains regular; much pain in lower sacrum. Sedatives given. After seventy-two hours os still three fingers; much meconium. Cervix incised under gas and air. 7¾-lb. baby born spontaneously three hours later. Cervix stitched at end of third stage. Excellent result. Two normal labours and one miscarriage since—no inertia.

Case 7.—Booked. Aged 31; primipara. Full term. No disproportion. No toxaemia. Medical induction. Pains regular but weak. Severe pain in lower back. After forty-five hours os still two fingers. Cervix cut under chloroform. Baby, 8 lb. 2 oz., born eleven hours later. Easy low forceps delivery. Later manual removal of placenta because of P.P.H. Good result. Both satisfactory.

Case 8.—Aged 25; primipara. Full term. No disproportion. No toxaemia. Spontaneous onset; membranes ruptured. Contractions poor to fairly strong. Much pain in lower sacrum and pubis. Maternal distress after thirty-six hours. After fifty-one hours os still three fingers. Cervix cut under light chloroform. Baby, 8 lb. 6 oz., born five hours later, spontaneously. Excellent result.

Case 9.—Booked. Aged 27; primipara. Full term. No disproportion. No toxaemia. Spontaneous onset. Pains irregular at first, and weak. Membranes ruptured on admission. Much pain in lower back. Sedatives and oestradiol given; no effect. After seven days os still only three fingers; maternal and foetal distress present. Cervix cut under gas and ether. Baby, 8 lb. 14 oz., born spontaneously eight and three-quarter hours later. Excellent result. Mother and baby satisfactory.

Case 10.—Emergency. Aged 29; primipara. Full term. No disproportion. No toxaemia. Spontaneous onset seventy-two hours before admission. Membranes ruptured by doctor. Foetal heart not heard. Contractions irregular and weak. Much pain in sacrum and pubis. After eighty-nine hours os still three fingers; maternal distress; meconium and little liquor. Cervix cut under whiff of A.C.E., and baby, stillborn and weighing 6 lb. 8 oz., delivered by forceps three and a half hours later. Good result. Mother's condition satisfactory at post-natal visit.

Case 11.—Emergency. Aged 23; one miscarriage. Full term. No disproportion. No toxaemia. Spontaneous onset; quinine after three days. Foetal movements stopped after six days; patient admitted. Pains moderated. Morphine given twice by outside doctor. On admission given glucose, anti-gas-gangrene serum, etc. After seven days os three fingers; maternal distress, offensive discharge of meconium and liquor; foetus dead. Cervix cut under gas and air, and stillborn baby, 8 lb., born spontaneously seven and a half hours later. Excellent result.

Case 12.—Booked. Aged 25; primipara. Full term. No disproportion. No toxaemia. Spontaneous onset. Pains slight; membranes ruptured early. Given sedatives and oestroform, with no effect. After 151 hours os two to three fingers only. Cervix cut. Baby born spontaneously twenty-three and a half hours later, weight 7 lb. 12 oz. Good result. Baby satisfactory. Mother—no milk, only serum in breasts.

Case 13.—Booked. Aged 24; primipara. Full term. First degree disproportion. No toxaemia. Spontaneous onset. Pains weak at first. Membranes ruptured four days after onset. Severe backache. On fourth day maternal distress marked; liquor became yellow and offensive. After 123½ hours mother's temperature 102°, pulse 120. Foetal heart not heard. Os two to three fingers dilated. Cervix cut. Os full six hours later and stillborn baby delivered by low forceps. Very good result as regards the operation. Mother developed septicaemia and peritonitis, and died twelve days after delivery. P.M.: no injury to uterus; general peritonitis present.

Case 14.—Booked. Aged 31; primipara. Twins. Aortic and mitral disease; toxaemia of pregnancy. At thirty-eighth week membranes ruptured spontaneously. Pains weak about one in ten. Patient was treated with sedatives, oestroform, etc. Os only two to three fingers dilated at end of ninety-eight hours. Maternal distress now well marked. Cervix cut at lateral angles without anaesthetic and without upsetting patient. Cervix immediately retracted. Six hours later os fully dilated. Easy forceps deliveries. Mother and babies did well. Post-natal examination showed a normal pelvis and multiparous cervix.

The following is not a case of inertia, but is interesting from the point of view of the marked shortening of labour after cutting of the cervix, with stretching of the vagina and ironing out of the perineum:

Booked case. Aged 20; primipara. Full term. No disproportion. Slight toxaemia. Admitted in labour. After sixteen hours os three fingers; pains strong and regular; scarcely any liquor left; marked foetal distress, foetal heart 80–90 between pains; much meconium. Os incised under gas and air, and baby born spontaneously one hour later. Mother and baby satisfactory.

Synopsis of Cases

All the patients were primigravidae, between the ages of 18 and 31. All the mothers made an uninterrupted recovery, except one in whom the intranatal pyrexia continued into the puerperium, causing peritonitis and death. Four of the cases were emergencies, the rest booked. Nine babies were born spontaneously, alive and well. Four of the babies were stillborn, three macerated: two of these were emergency cases; in one, foetal distress was well marked on admission, while in the other the foetal heart could not be heard. Seven babies (one set of twins) were delivered by low forceps. Time in the first stage

before operation: 45, 48, 51, 52, 61, 71, 72, 89, 98, 123½, 130, 151 hours, 7 days, 7 days. Average hours in labour before operation, 94. In no case was the os more than three fingers dilated. Average interval between operation and termination of labour, nine hours. Three patients were actually delivered spontaneously in three hours or less.

Conclusion

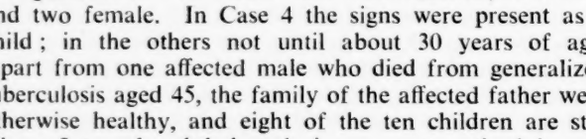
A simple method of expediting cases of severe uterine inertia has been described, and though the number is small, I feel confident that if cases are selected as described the treatment is simple and very successful.

Clinical Memoranda

Familial Ptosis with Ophthalmoplegia Externa starting in Adult Life

Ptosis occurring congenitally in members of the same family is fairly common, and occasionally this is combined with external ophthalmoplegia (Panas, 1896; Cooper, 1910). Frequently, also, a condition of congenital ptosis, ophthalmoplegia, and epicanthus has been described, and the condition has been recorded in detail in four generations by C. H. Usher (1925–6). Ptosis starting in adult life associated with external ophthalmoplegia of a slowly progressive type is comparatively rare. Beaumont (1900) reports twelve cases in three generations. In these cases the disease always had its onset in adult life.

In the family to be described five cases occurred in two generations—the father and four children, two male and two female. In Case 4 the signs were present as a child; in the others not until about 30 years of age. Apart from one affected male who died from generalized tuberculosis aged 45, the family of the affected father were otherwise healthy, and eight of the ten children are still alive. Internal ophthalmoplegia was not noticed in any of the patients examined, and there was no history of goitre.



Case 1.—The father, who was an only child, died at 49, at which time he had severe ptosis of both upper lids, but especially of the left. He had to hold up his lids to see properly. I have seen a photograph taken some years before his death showing the ptosis.

Case 2.—Mrs. A., aged 65, has two daughters, aged 35 and 32, not affected so far. She has bilateral ptosis, which came on approximately at 30 to 35 years of age, and wears props attached to her spectacles to keep her eyes open. Her upper lids cover three-quarters of the pupillary area in the right and almost the total pupillary area in the left (4 mm. pupils). She has no diplopia, but there is limitation of the ocular movements, with only very slight movements of the eyes upwards, marked limitation laterally, and some diminution of downward movement.

Case 3.—Mr. B., died aged 45, had left-sided ptosis at the time of his death.

Case 4.—Mrs. C., aged 59, states that her lids have been drooped since a child, and blames an attack of measles for the onset of the trouble. Her left lid covered approximately five-sixths of the pupillary area, and the right covered the upper third. The pupils were approximately 3 mm., and no evidence of external ophthalmoplegia was found. She has defective upward movement and some lateral diminution of the movement, apparently more marked, of the left eye to the left side. There is no diplopia. She has no family.

Case 5.—Mr. D., aged 53, has had trouble since before 30 years of age. The lids cover half of the right and two-thirds of the left pupillary area (pupils approximately 5 mm.). He complains bitterly of diplopia, and to avoid this keeps the left eye closed. The diplopia is chiefly due to left hypotropia. There is no upward movement of the left eye, and diminution of lateral movements of the eyes. I have suggested trying prisms or even a tarsorrhaphy on the left side, but he prefers to continue as before. The patient's family have, I understand, no signs of similar trouble, but I believe the eldest is still under 30 years of age.

Manchester. S. H. Faulkner, M.D.

References

Beaumont, W. M. (1900). *Trans. Ophthal. Soc. U.K.*, **20**, 258.
Cooper, H. (1910). *British Medical Journal*, **1**, 917.
Panas (1896). *Arch. Ophtal.*, **16**, 721.
Usher, C. H. (1925–6). *Ann. Eugenics*, **1**, 128.

Traumatic Pancreatitis in a Child

The memorandum by Mr. Armstrong in the *Journal* of June 17 (p. 1230) prompts me to record the following case.

Case History

A boy aged 7 went home crying and told his mother of a kick in his stomach. It was not till after three days that severe abdominal pain set in. As a brother had died of acute appendicitis the parent summoned the doctor, who noted the spasmodic nature of the pain but at first found no tenderness. Later in the day he suspected peritonitis and sent the patient to hospital. The aspect of the child accorded well with acute appendicitis, and the right iliac fossa was very tender. However, on further examination the tenderness was found diffuse. It was in the hypogastrium, well marked in both loins and across the epigastrium; this led to misgivings about the diagnosis, and these deepened when heavy glycosuria and slight acetonuria were discovered. Traumatic pancreatitis suggested itself, but was dismissed because of the lucid interval since the alleged accident. Evidently peritonitis existed though the cause thereof was obscure.

On July 13, 1938, under spinal anaesthesia, a thickening was felt beneath the right rectus about the level of the transverse colon. Through a right paramedian incision bile-stained fluid ran forth, also some coagulated lymph. On depressing the transverse colon watery swelling and fat necrosis were noted in the gastro-colic omentum, which I opened to drain the damaged pancreas. A suprapubic drain was next inserted, and, finally, a retroperitoneal stab drain was used in the right iliac fossa to evacuate a bag of watery exudate behind the posterior iliac peritoneum. The patient recovered rapidly, and when seen two months later he was very well.

The interesting features in the case are: (1) The age of patient (7 years). (2) The latent period of three days before peritonitis; this was also noted in Armstrong's case. (3) Gravitation of retroperitoneal exudate from the pancreas into the right iliac fossa, which drew attention away from the underlying lesion.

Bristol. A. Wilfrid Adams, M.S., F.R.C.S.

Catatonia.—This condition, persisting for twelve days, is described in a cannabis indica addict. During this period the patient was terrified by the mention of police or prison. The origin of this condition in cannabis indica addicts is discussed. The author considers that it is produced by cortical inhibitions produced by the drug, leading to the liberation of automatic subcortical mechanisms.—Catatonic Syndrome in Acute Psychosis due to Cannabis Indica. P. Scouras.—*Encéphale.* February, 1939, **34**, 78.

Reviews

EXPERIMENTAL MEDICINE

The Harvey Lectures, 1938–39. Delivered under the auspices of the Harvey Society of New York. Series 34. (Pp. 279; 16 illustrations. 18s.) London: Baillière, Tindall, and Cox. Baltimore: Williams and Wilkins Company. 1939.

We always look to the annual Harvey Lectures for enlightenment on some of the more obscure aspects of experimental medicine, and not in vain, although as time goes on they inevitably become more specialized in their interest.

Professor G. F. Marrian leads off with a discussion of the metabolism of those hormones which may be conveniently termed "steroids," since they all contain a particular phenanthrene ring; the group includes the natural occurring androgens, oestrogens, progesterone, and adrenal cortical hormone, in addition to many others synthetically prepared. Much work has been done on their biochemical history in the body, and, as the author remarks, speculation on their possible modes of origin and conversion is becoming the fashionable biochemical pastime. Dr. A. A. Weech deals with the behaviour of the albumin fraction of serum and its response to dietary changes in the hope of throwing light on the rational treatment of patients depleted of this constituent of the blood. Professor E. J. Cohn discusses at length the chemistry of proteins, with special reference to their ionic nature. Professor E. F. du Bois, after a full investigation of the factors controlling the loss of heat from the human body, pathetically expresses his doubt that any of this work will have the slightest influence on clothing, since here custom and fashion reign supreme. Dr. E. A. Park's detailed consideration of the pathology of rickets is full of interest. He does not believe that withdrawal of lime salts from the organic matrix occurs in rickets. Decalcification of bone is a misleading phrase, for the calcium salts are not simply dissolved out. Nature's method of obtaining the calcium is to break down the organic matrix at the same time as the mineral content is released. Osteoid—that is, bone free from lime salts—is a stage in normal growth, mineral deposit coming later. The presence of osteoid in excess is a cardinal sign of rickets, the well-known defective absorption of calcium from the bowel preventing its deposit. The characteristic irregularity of formation of osteoid in rickets follows exactly the lines which might be expected in view of the fact that pressure stimulates new formation of bone and tension exerts no influence at all, unless an actually destructive one.

Dr. Linderstrom-Lang's lecture on enzymes in tissues and cells is for the biochemical elect, but Professor Szent-Györgyi's contribution on biological oxidation and vitamins, though abstruse, contains some interesting generalizations with a clinical bearing. Although the radiant energy of the sun is the ultimate source of all life-sustaining energy it cannot as such directly support life; otherwise life would fail at night. It is known that chlorophyll is the intermediary, but it is only of recent years that any clear conception has been gained of the way it acts beyond the fact that it returns oxygen to the atmosphere. This is a necessary consequence of the splitting of the elements of water and the fixing of its hydrogen to a carbon chain. There is really only one fuel, and that is hydrogen. All our food is essentially but a fixed form of hydrogen, and all the energy which supports life is derived from its oxidation with the formation of water. The splitting is accomplished by Keilin's cytochromes (one at least of which contains iron) and Warburg's enzyme. This iron atom is alternately oxidized and reduced. Ferrous iron contains one more electron than the ferric, and it is the handing over of this electron which is the activator of a series of changes too complicated to describe here; we are shown, however, that it throws light on the pigmentation of Addison's disease.

Man cannot live without his adrenals; but why does he turn brown before dying? Many fruits such as pears and bananas also turn brown when dying, while lemons do not. The brown pigmentation is due to the oxidation by an enzyme of catechol derivatives, while in those plants that do not turn brown the process is inhibited by a strongly reducing substance containing two very labile hydrogen atoms; this is ascorbic acid, which Szent-Györgyi found so abundantly present in Hungarian red pepper. Presumably the reducing substance normally present in the adrenal cortex is similar, and thus we remain unpigmented. Catechol and ascorbic acid both contain a dienol group on which the transferred electron exerts its effect. In the absence of ascorbic acid the oxidation of catechol to a pigmented derivative is not inhibited and the patient turns brown.

Professor Danforth's fascinating lecture on genes and hormones contains so much of fundamental biological interest that it has been made the subject of a leading article elsewhere in this issue.

SENSATION AND THE PSYCHE

Psyche and the Physiologists and Other Essays on Sensation. By Edward Guy Dru Drury, M.D., B.S., D.P.H. (Pp. 98: 5s. net.) London: H. K. Lewis and Co.

Dr. E. G. Dru Drury's occasional addresses are sought and welcomed in South Africa, and they are known and highly appreciated by many medical practitioners and others in this country. He has recently collected six such addresses which he has delivered of late years and published them in a small volume. They will, in reading, give pleasure and profit to a wider circle than those who originally heard them, though the author's delivery must have added greatly to the enjoyment of his varied audiences, for they afford abundant evidence not only of an original mind but of a striking personality and a power of vivid verbal expression. They are no doubt most easily assimilable by select audiences of what may be called a university type, but not merely by members of the medical profession or faculty. Two of them—that which gives its title to the collection and that headed "What do we Think With?"—were given at the Rhodes University College, the former to its Scientific Society and the latter to its Philosophical Circle. Two of them, "Labels and Luggage," and "Visceral Disharmony," were given to medical audiences at meetings in connexion with the Medical Association of South Africa (B.M.A.); one, "On Boredom," was delivered to teachers; and one, "On Growing a New Claw," to a branch of the Trained Nurses' Association. All alike require a certain alertness of mind for their full appreciation; but, with this, readers even more than hearers will be able to enjoy Dr. Dru Drury's subtleties of thought and expression and the originality and novelty of his point of view. This originality and novelty constitutes the main value of his collected essays. It is combined with a facility of apt quotation from a very wide selection of the writing of others, and with an illustrative suggestiveness of metaphor which is usually equally happy.

The author's theme, which holds a certain unity throughout, is, as indicated by his titles, the connexion and relation

between physiological sensation and psychological reaction; and, in addition to the enjoyment of the characteristic thought and expression to which attention has been drawn, any reader, be he medical or lay, should be able to derive some very practical and valuable lessons. The astonishing and rather gruesome account of "growing a new claw" in particular will not only provoke a real retrospective sympathy for the author in every reader, but demonstrates very vividly how the sufferings of a medical practitioner in his own bodily illness may lead to a profitable enlargement of understanding both in the physiological and in the psychological field.

CASE-TAKING AND PHYSICAL DIAGNOSIS

Workbook in Elementary Diagnosis for Teaching Clinical History Recording and Physical Diagnosis. By Logan Clendening. (Pp. 167; illustrated. 7s. 6d. net.) London: Henry Kimpton. 1938.

Dr. Logan Clendening, professor of clinical medicine in the University of Kansas, brought out in 1934 *The Laboratory Notebook Method in Teaching Physical Diagnosis and Clinical History Recording,* and, as the clinic is simply a laboratory of a slightly different kind, this new book is described as a somewhat expanded rearrangement of that notebook. The author is evidently a keen and experienced teacher and has here provided a clear and elementary guide for medical students at their entrance on clinical work. But it is so graphically illustrated by a picture gallery of methods of physical examination—for example, the deep grip palpation, fist palpation, and hammer percussion of Murphy, and testing for protopathic sensation—and also representations of the facies and gaits in disease, that there may well be an appeal to those whose undergraduate days are long past. Further, the sometimes dry bones of physical signs are made interesting by brief verbal reproductions of their original accounts, thus recalling *The Classical Descriptions of Disease* by his colleague Professor R. H. Major, to whom and others gracious acknowledgments are made. A postscript contains some aphoristic reliefs such as, "Physical diagnosis is an art, and the mastery of an art has no end. You can always be a better physical diagnostician, just as Paderewski could always become a better pianist or Leonardo a greater painter. . . . Even a reading of *Hamlet* will improve your percussion. . . . A brilliant but erratic physician was asked to examine a patient; he paused a yard from the bed's foot and said, 'What do you want to know about this woman?' 'I want a diagnosis,' said the intern, 'She has a tuberculous cavity in her left apex,' was the answer, as he passed on. His only explanation was that she always had a full sputum cup, and was always lying on her left side." No doubt such snapshot diagnoses are dangerous, but they illustrated some important principles of physical diagnosis, such as alertness of perception and logical deduction.

TUBERCULOSIS IN PRIMITIVE PEOPLES

Primitive Tuberculosis. By S. Lyle Cummins, C.B., C.M.G., LL.D., M.D. (Pp. 213; illustrated. 10s. 6d. net.) London: John Bale. 1939.

It is now universally recognized that in the development of tuberculous disease in man "soil" plays a part as important as "seed." In attempting to understand the interrelations between the tubercle bacillus and the varied resistance mechanisms in civilized races the study of tuberculous manifestations in primitive communities must therefore be of obvious value. Writing with the authority based on many years' work in the Tropics and experience as adviser and consultant to the Tuberculosis Research Committee of South Africa, Professor Cummins has performed a service in collecting the information available on this subject. An introductory chapter on wild and domestic life in relation to tuberculosis is followed by a discussion on the definition of "primitive" communities. Professor Cummins points out that words like "primitive" and "isolated" have no clear-cut or definite implications when used to describe human communities; they have a relative meaning only. After sketching the native outlook, he summarizes the work published in the past on tuberculosis of Africans, special chapters being devoted to investigations with the tuberculin test and to tuberculosis in South African natives. There follow sections dealing with the well-known investigations among the native miners of the Witwatersrand with which the author was very closely associated. He then reviews reports on tuberculosis in Africans who have temporarily left Africa, in Africans by descent or American Africans, in American Indians, in primitive tribes of various nationality, and in India. Short chapters are devoted to animal tuberculosis capable of affecting the human body, to B.C.G. vaccination, and to treatment. Finally Professor Cummins attempts to explain the differences in susceptibility found, putting forward his own theory after presenting various points of view hitherto held. He concludes:

"One thing is certain: that the child, whether in our own race or in the primitive, is alike in having no acquired immunity. The type of disease is similar in the two when disease ensues. But disease nearly always ensues in the negro infant infected with the germ, whereas it is the common experience of our race to bring up healthy but tuberculin-positive children. One must talk with references to averages, and, while it is possible to produce exceptional cases, it is, on the average, easy for the infant of tried stock to elaborate immunity and overcome his infection, whereas it is hard for the primitive child to do so. And it is not only the child but the adult of primitive stock that give us the picture associated with childhood in this country."

The bibliography of 180 references will be found of great value, but it is a pity that a monograph containing so much quoted matter should not have been provided with summaries or conclusions at the end of each chapter. Attention must also be drawn to a typographical defect: in the latter part of the book particularly an unusually large number of words show misalignment of the last letter.

METEOROLOGY AND DISEASE

Essai de Météoropathologie: Physique, Clinique, Thérapeutique. By W. Kopaczewski. (Pp. 296; 14 maps; 26 tables. 50 fr.) Paris: J. B. Baillière et Fils. 1939.

In the introduction to his work on meteoropathology Dr. W. Kopaczewski states that though the part played by various meteorological factors in the appearance of certain pathological conditions has been realized since Hippocrates and emphasized by many subsequent writers, especially Pettenkofer, considerations of the kind have been completely forgotten since the advent of bacteriology, when the microbe became the sole criterion of health or disease. It is in opposition to such an exclusive view that the author has undertaken the present work, in which he emphasizes the important part played by meteorological factors in the causation of disease.

The book is divided into three parts devoted respectively to experimental work, the clinical aspects of the subject, and therapeutics. In the experimental section he discusses the physical data connected with the atmosphere, including chemical composition, degree of dispersion, electric potential, humidity and pressure, as well as the various solar rays. Physiological observations next receive consideration, and an account is given of the action

on living beings of radiations according to the length of the wave and of the air according to its degree of dispersion. The author then describes various forms of simple apparatus for carrying out certain meteorological observations such as the determination of the temperature of the air, atmospheric pressure, rate and direction of wind, degree of humidity, and so on. In the clinical section, after a description of the regulating mechanism, including thermo-regulation, barometric regulation, hydro-regulation, electro-regulation and actino-regulation, the author deals with forms of acute meteorological shock liable to occur when the regulating mechanism is upset and the less dramatic morbid manifestations due to heredity or acquired predisposition to the action of meteorological factors. Lastly, in the section of therapeutics he includes an account of the various forms of climate in France illustrated by a number of hitherto unpublished charts supplied by the French Meteorological Office; hygiene, including clothing, housing, diet for predisposed persons; and the treatment of various pathological conditions. An international bibliography of 257 references is appended.

LOWER SEGMENT CAESAREAN SECTION

Caesarean Section: Lower Segment Operation. By C. McIntosh Marshall, F.R.C.S. (Pp. 230; 107 figures; 2 plates. 21s. net.) London: Simpkin Marshall, Ltd.; Bristol: John Wright and Sons, Ltd. 1939.

The author of this excellent book has performed 250 consecutive lower segment Caesarean sections with no maternal mortality. This is in spite of the fact that approximately one-third of his patients were infected or "suspect" before operation. He therefore writes with authority, and he writes well.

"It cannot be denied that of the women who undergo Caesarean section more than two-thirds die, and barely a third are saved. Caesarean section belongs to those operations of which the outcome is entirely uncertain. Before, then, undertaking this procedure, one should allow the patient to draw up her will and grant her time to prepare herself for death."

The book opens with these words of Osiander and very appropriately ends with an analysis of Mr. Marshall's splendid results. The evolution of technique which in 200 years has converted a lethal operation into a life-saving one is admirably summarized. The anatomy of the uterus, and especially of the lower segment, during pregnancy, labour, and the puerperium is described in detail, and with this as a background the various possible incisions are discussed. The subject of anaesthesia is rightly given prominence. Mr. Marshall compares his experience of ether, spinal, and local anaesthesia with that of many other surgeons, and expresses the opinion that only by the persistent use of local infiltration can the operative mortality be reduced to a minimum.

Anaesthetic and operative technique are carefully described and admirably illustrated, and special attention is paid to the treatment of the infected patient. Readers are reminded that the third stage is of importance with Caesarean section just as with delivery per vaginam, and the methods of avoiding haemorrhage, or of controlling it when it does occur, are carefully described. The place of the lower segment operation in the treatment of placenta praevia is well discussed in a stimulating and slightly provocative chapter in which a reason, and usually an excellent one, is given for every practice advocated.

No obstetrician or surgeon who performs Caesarean section should fail to read this book. It has been most carefully prepared and arranged, is very well illustrated, and must take pride of place as the English classic on the subject.

Notes on Books

A fourth edition of *Hypertension and Nephritis*, by Dr. Arthur M. Fishberg, is published in this country by Baillière, Tindall and Cox at 37s. 6d. This well-established work contains not only an admirable summary of the present knowledge of the subject with ample bibliographies but the result of much personal observation, especially at the Mount Sinai Hospital where the author works. The advances of knowledge in the interval have called for much revision; there is a new chapter on azotaemia, and additions have been made to many sections, for example, the experimental production of glomerulonephritis, the use of mercurial diuretics, the nephrotic syndrome in diabetes mellitus, and the treatment of nephrotic oedema by the intravenous injection of large volumes of acacia solution. Attention is fully paid to Goldblatt's experimental production of hypertension by constriction of the main renal arteries by clamps and the resulting renal ischaemia, and to the possibility that this explanation—namely, obstruction of the main renal arteries—may apply to some human cases without renal arteriolosclerosis. The question of hypertension due to factors other than renal, such as adrenal tumours and pituitary basophilism (Cushing's syndrome) is considered. The author prefers the title "the malignant phase of essential hypertension" to the shorter one "malignant hypertension," and emphasizes that this phase is due to damage and necrotic changes in the renal arterioles and glomerular tufts caused by long-continued and very high diastolic blood pressure. He has given much attention to the descriptions of symptoms and the simple methods of diagnosis, and points out that a study of blood chemistry is necessary in a minority only of hypertensive patients.

Two years after the publication of Lionel Fifield's *Infections of the Hand* its promising author was killed in a motor accident. His thoroughly sound and workmanlike book has been a valuable bequest to many students, house-surgeons, and practitioners, and now a second edition is very welcome (H. K. Lewis, 9s.). Mr. Patrick Clarkson, who has been responsible for this second edition, has revised and rewritten several chapters and introduced references to the newer accessory methods of treatment such as sulphanilamide therapy and short-wave diathermy. He is to be congratulated on a revision which, while still possessing the background of Fifield's work, brings this thoroughly up to date. Mrs. Clarkson's line diagrams are clarity itself and add much to the attraction of the book. The chapter on insurance aspects and prognosis will be helpful to many. The book should be read by all house officers and young practitioners. There is still too much incorrect and inopportune treatment of injuries and infections of the hand through lack of that guidance which such a work as this admirably supplies.

Success with an earlier introductory work on general biochemistry has encouraged Professor Roger Williams to write *A Text-Book of Biochemistry* dealing more particularly with animal biochemistry. This stands about midway between the very elementary introduction designed for readers new to the subject and the larger treatises containing a great wealth of detailed information, but it does not consistently maintain that position. In many places the treatment of the subject-matter is that of the first type, whereas elsewhere it offers an unusual amount of detail. For example, tabulated data relating to the composition of body tissues take up 15 pages. Such an array of figures is not in keeping with the expressed intention of the book, which is not to provide a storehouse of information but is, to quote the preface, "to *develop insight* . . . into the phenomena of biochemistry." On the whole the author has succeeded in his primary aim; the relevant facts are as fully discussed as is necessary to the fundamental understanding of the many phenomena brought under consideration; the mode of

presentation, despite a number of vague statements, is attractive, and the author takes special care to explain difficult technical terms. He is at his best with the vitamins (sources and requirements are given close attention) and biochemical catalysts, and these sections, coupled perhaps with the brief but very instructive chapter on the chemical aspects of nervous control mechanism, would in themselves establish the book as one well worthy of attention. It is published by Chapman and Hall at 21s.

Professor Hans Kleinschmidt, director of the Children's Clinic at Cologne, assisted by nine other writers from Cologne and one (Dr. Heinrich Heinlein) from Bonn, recently published an instructive work on poliomyelitis with special reference to the epidemic at Cologne in 1938. All aspects of the disease are considered, including history, aetiology, epidemiology, morbid anatomy, pre-paralytic and paralytic stages, examination of siblings and children in schools where cases have occurred. The number of cases in the Cologne district (including 399 with 37 deaths in the town of Cologne itself) amounted to 551 with 44 deaths. Apart from several cases occurring in one family, there were no instances of multiple attacks in the same houses, and no doctors or nurses caught the disease. As regards seasonal distribution, the disease appeared in the late summer and autumn months and rapidly declined in the last quarter of the year. Thus of the 399 cases in the town of Cologne there were only 14 cases between January and July, whereas there were 148 in August, 140 in September, 74 in October, and only 17 in November and 6 in December. As regards the occurrence of abortive cases, systematic examination of children who had been in contact with definite cases showed that one-third of the former presented marked changes in the cerebrospinal fluid, though clinical symptoms were trivial or entirely absent. Specific treatment either prophylactically or therapeutically in the form of convalescent serum was disappointing. In contrast with the results obtained in London with the Drinker apparatus, no benefit was derived with the artificial respirator known as Eisenmerger's biomotor during the Cologne epidemic. A bibliography of over 360 references is appended, of which only two are British. The publisher is S. Hirzel of Leipzig.

Congenital fragilitas ossium is the subject of another monograph by Dr. H. Fulconis, who has not only analysed clinical and pathological material but has carried out certain experiments which lead him to suggest that current views on ossification in the normal subject require revision. He brings forward suggestions that there is a definite endocrine control of the laying down of calcium in the bones, and in the treatment of this condition of brittle bones he uses a diet of milk from animals which have been ovariectomized. There is much of interest for paediatricians in this slim volume, which is published in Paris by Masson et Cie at 28 fr.

Preparations and Appliances

LIGHT WHEELED CARRIERS

Dr. A. P. Thomson, F.R.C.P., Commandant of the General Hospital, Birmingham, writes:

Stretcher bearing is heavy work, and to reduce the labour and increase the speed and smoothness of transport of a large number of stretcher cases from the casualty block of the General Hospital to the wards and resuscitation department the Raynal Manufacturing Company, Ltd., Woodburn Road, Birmingham, 21, have designed and made for us a number of the light wheeled carriers (shown in the illustrations) which have proved satisfactory in use. The weight of the carrier is 20 lb., and by means of clips it may be attached to a stretcher (either the old wood and canvas type or the new steel and wire one) so that two bearers can lift both with a patient over obstructions such as a small flight of stairs or a kerbstone. The carrier runs easily and will turn in its own length: one man can push it fully loaded on a smooth surface without difficulty for a considerable distance. It will stand by itself with the patient tilted slightly with the feet down, and even with four folds of blanket under him there is no tendency to slipping. A restless patient should not remain on the stretcher unattended as, although fairly stable, it can be overturned if the patient leans well over the side.

Fig. 1.

Primarily designed for use in large institutions, I believe the carrier would also be valuable in aid posts, general stretcher bearing on paved roads, and on railway platforms for the loading of ambulance trains. The carriers can be stacked in nests of three and occupy little space when not in use. Another type will be available shortly; fitted with more elaborate supports so that with a stretcher it may completely replace the heavy four-wheeled trolley; and (if there is any demand) one fitted with larger tyres and springs for use on rough roads and a collapsible carrier for transport in motor ambulances can be supplied.

Fig. 2.

BRITISH MEDICAL JOURNAL

LONDON

SATURDAY OCTOBER 28 1939

CHEMOTHERAPY AND INFECTIONS IN WAR

It so happens that there was time enough between 1935 and the outbreak of war for extensive study of the action of prontosil and its derivatives in bacterial infections. Though many subsidiary questions in the clinical sphere of this study remain to be settled, and perhaps a few more fundamental problems on its theoretical side, there is now a solid foundation of experience by which intelligent therapy may be directed with a degree and certainty of benefit such as no previous remedy for the same conditions could approach. In present circumstances it is unlikely that further study, either experimental or clinical, will be able to proceed at the same pace, at least in Europe. The uncertainties and anxieties of war, as well as the manifold inconveniences which have been entailed even in preparation for it, impose conditions in which research is the first thing to suffer. What we are probably about to see is not an extension of existing knowledge so much as its application to new conditions. If the medical problems of this war are to be of the same nature as those which arose in 1914–18, we can name beforehand certain infections in which the advent of chemotherapy will alter prospects completely. Meningococcal meningitis will be shorn of most of its previous mortality. The period of invalidity from gonorrhoea will be greatly reduced, and if large numbers of troops are treated in hospital complete control of the patient and opportunity for the fullest possible study of the progress of the disease should lead to the final definition of an optimum plan of treatment; both the choice of drug and the method of using it are at present somewhat varied. If a pandemic of influenza visits us we shall know whether chemotherapy can control the septic pneumonia which caused innumerable deaths in the autumn and winter of 1918.

These and other problems of ordinary medical treatment may prove to be of secondary importance to that of wound infection. It is here that new observations will need to be made and new policies defined. Gunshot wounds, or anything equivalent to them produced by other means, are rare accidents in civil life, and there is singularly little published information on the results to be achieved by chemotherapy in the prevention or cure of infection in such cases. On the other hand, it is safe to predict on theoretical grounds and on the basis of other experience that certain results will be obtained. There need, for example, be no hesitation in assuming that haemolytic streptococcal infection of wounds will be controllable; this was a dangerous and disabling form of sepsis, and in chest wounds often fatal. Among the commoner and usually less dangerous flora of wounds, staphylococci are likely to survive most chemotherapeutic attacks, whereas coliform bacilli, *Proteus*, and *Pyocyaneus*, if they behave in a wound as they are known to behave in the urinary tract, will succumb. It will be a question whether the more rapid closure and healing of a wound possibly so to be achieved justifies such risk and discomfort as adequate chemotherapy entails. Perhaps the most vital question of all is that of the benefit to be expected in gas gangrene. There can be little doubt that sulphanilamide has brought this infection rapidly under control in some cases without the aid of other treatment; no one acquainted with the facts would fail to administer this treatment; and we welcome the recommendation given in a War Office memorandum (published at page 834 of our last issue) that all wounds which appear likely to become the site of infection with gas gangrene should receive a prophylactic course of sulphonamide compounds at the earliest opportunity. How far it should replace amputation is another matter; and another on which clear guidance will be needed is the proper sphere of chemoprophylaxis. This question applies not only to gas gangrene but to wound sepsis generally, and in time it will doubtless be known whether it is the best policy to give every casualty a short immediate prophylactic course, or in certain types of case at least to await events.

In meeting the demands of these new conditions the soundest guide will be a thorough knowledge of the established facts of past experience in chemotherapy. Personal experience is helpful up to a point, but the reasoned conclusions of investigators with special opportunities from all over the world should not be ignored, and whereas most of these have hitherto been available only in original papers, they have now been ably collected and summarized in book form by Perrin H. Long and Eleanor A. Bliss of the Johns Hopkins University, Baltimore.[1] For reasons already suggested, this review of the past four years' developments may have a less ephemeral value than might have been expected. It covers the whole field—historical, theoretical, experimental, and clinical—and whether dealing with the disputed mysteries of how these compounds act or with the simpler facts of how or when they can best be used, the available know-

[1] *The Clinical and Experimental Use of Sulfanilamide, Sulfapyridine and Allied Compounds.* By Perrin H. Long, M.D., and Eleanor A. Bliss, ScD. New York: The Macmillan Company. (15s. 6d.)

ledge is presented in a full but easily assimilable form. Each infection and each manifestation of it is separately treated, so that information can readily be found about the treatment of almost any type of case. The authors express decided personal opinions on matters within their own experience, and though everyone may not agree with all of these, no one will deny that the judgments expressed are in the main well informed and amply founded. To have condensed so vast a body of data into readable but sufficient form is no small achievement, and those who regulate their use of the new chemotherapeutic compounds in accordance with the principles and the detailed instructions here laid down will have good cause to be grateful for such guidance.

GENES AND HORMONES

Co-ordination of the results arrived at in different fields of knowledge becomes ever more difficult with increasing specialization, the worker in one field knowing little of what is being done in another, so that advance along a united front is delayed. It was unfortunate that Sir Albert Seward's presidential address to the British Association was delivered on the very eve of war, thus not receiving the attention it deserved. An acknowledged expert both in geology and botany, he turned his life work on fossil plants to good account not only by resurrecting the legendary lost continent of Thule as a scientific reality, but by illustrating the great advantage of combining two methods of approach to a problem. In the same way Professor Danforth in the Harvey Lectures, reviewed elsewhere in this issue, shows that pooling the results obtained in genetics and endocrinology gives us a clearer and more harmonious view of some important biological processes. The basic phenomenon of genetics is believed to be the independence and discreteness of the individual gene. Reproducing itself precisely except for rare mutations, immortal on Weismann's theory, it emerges from each new combination as pure as an atom released from a chemical compound. Genes and cytoplasm may be regarded as symbiotic, the gene influencing the reaction of the cytoplasm to both internal and external stimuli. Hormones may be regarded as activators, but can only act through such protoplasm as will respond to them. The same is true of organizers in the embryo. The specificity of most of their reactions apparently depends more on the receptive capacity of the tissue than on the hormones themselves. It is largely a question of whether or not the tissue will utilize the hormone if it is available. Their effects, if sometimes scarcely less profound, are generally more transient than those of genes. The evolutionist is intrigued by the fact that certain synthetic products can produce similar results. He begins to suspect that a hormone may antedate phylogenetically any adaptation of the tissues for its use. We are reminded of the hermit crab that seizes on an empty whelk shell. The crab was in existence before it found a suitable local habitation. Again, the presence of oestrogens in the coal measures greatly antedates the first appearance of mammals on the earth. Presumably they were first evolved by the plants, and the reason that they are oestrogens at all is inherent in the cyclic character of plant growth. Perhaps we have been prone to draw too sharp a line of demarcation between hormones and vitamins, and between both of them and simple chemical and physical factors on the one hand and genic influences on the other.

The biological advantage of sexual reproduction used to be attributed to a fresh blending of protoplasm and nucleus in the cell. Professor Danforth points out an additional advantage; in parthenogenesis identical genes would be thrown into direct competition with one another in the struggle for existence, with consequent extermination, whereas mixture of genes may lead to improvements perpetuated by natural selection. Without sexual reproduction it is doubtful if the kind of protoplasm which early appeared in the world could ever have reached the high degree of differentiation which the interaction between cytoplasm and new combinations of genes will favour. Botanists long ago pointed out the sequence from zoospore through isogamous gametes to heterogamous gametes and finally to ovum and sperm cell. Sex started as a difference between germ cells and has evolved into a difference between individuals. Indeed, the differences found in various species strongly suggest some such evolutionary sequence. In a vast array of lower animals the stage persists at which each individual may produce either sperm or eggs; age or season may determine which. This is particularly noticeable in the molluscs, where there is a widespread tendency to protandry which in young individuals is capable of overriding the normal female pattern of chromosomes. But when the animal reaches full maturity the chromosomal pattern overcomes the protandry, which, it is suggested, depends on humoral influences. This is strikingly substantiated by the recent studies of Moewus on reproduction in a species of *Chlamydomonas*. Kept in the dark they are without cilia and reproduce vegetatively, but if brought into the light they develop cilia and motile gametes. This will occur even in the dark on the addition of filtrates from cultures grown in the light. If the cultures are grown in red or orange light an inactive form of filtrate emerges. If this is subsequently exposed for a few minutes to blue or to violet light it can activate female gametes, and then, after another inactive phase, male

gametes, after which it remains completely and permanently inactive. Identical results can be obtained in the dark by merely adding a carotene derivative allied to vitamin A. Thus sex seems to be determined by chemical environmental factors in a number of lower forms of life. Such manifestations are suggestive of the hormonal activity seen in higher forms. With some birds certain of these characters seem to be almost completely under hormonal control. Among mammals there is the well-known example of the "free-marten," and sex reversals have been experimentally obtained in mice and rats. In human beings virilism of hormonal origin is clearly recognized. That some such changes can be induced apart from direct interference with the gonads is clear. A piece of skin transplanted at hatching from a male to a female dwarf turtle-dove produces male feathers over an area which goes on increasing. This can only be due to genes and cytoplasm descended from the original transplant, and evidently the female produces no hormone whose action opposes them. A similar experiment in the pheasant produces feathers which are a compromise between male and female plumage, while with the brown Leghorn fowl the feathers are always those of the host. In other words, in the dove sex differences in plumage are regulated by genes without reference to hormones, whereas in the Leghorn they are regulated by hormones without reference to genes. In the pheasant both factors must be operative.

The conclusion seems to be that the gene can influence the chemical make-up of the cytoplasm. In evolution the rearrangement of genes that has been found most advantageous for increasing that influence is the one provided by sperm and ovum. The growing complexity of the resulting protoplasm enables it to react to appropriate extraneous chemical substances. Important among these are the vitamins for which the cell has acquired a need in the course of evolutionary development, and the hormones based on pre-existing chemical material which the body has evolved the capacity to synthesize. These substances may in their turn reinforce the activity of the genes, though in some cases they may diminish or actually override it. Evidently there is close interaction throughout. It is not irrelevant to recall Witschi's observations on the abnormalities of growth brought about by experimentally delaying the fertilization of frog's eggs. The change of the chromosomal pattern and the interference with the chemical organizer thus induced give rise to bizarre types of cells, which in extreme instances acquire the characteristics of malignant growths. Pathological reactions are, after all, special instances of physiological ones induced by some abnormality in the external or internal environment. Only by a fuller knowledge of the normal processes of growth shall we be able to comprehend the nature of malignant growths.

FOOD AND A FIT NATION

In his three Harben Lectures delivered on successive days in the third week of October under the auspices of the Royal Institute of Public Health and Hygiene Sir John Boyd Orr made an extended reference to the importance of nutrition in war time, and recalled instances of the breakdown of nations at war not primarily as a result of military pressure but because of lack of food. The Allies, he said, must win this war at whatever cost, but while armaments were important they were of no use unless there was a fit nation to assemble and employ them. Therefore the feeding of the people in war time became of the greatest importance. It would be disastrous, he said, even from the immediate point of view of the war, if the big improvements in health and physique which had taken place in recent years were not carried further and consolidated. An increased consumption of protective foodstuffs was necessary. The urgent thing was to provide more dairy produce and more fruit. The capacity of the country to produce in these directions had never been anything like fully exploited. Production could be enormously increased, not only on farms but in gardens and allotments, even down to planting lettuces in window-boxes. If the people understood the need, said Sir John Orr, and put themselves to it, the result would astonish agricultural experts. The real aim of the war was something much wider than the destruction of Hitlerism; it was the establishment of international conditions under which the great achievements of science could be used in the creation of a golden age of liberty and peace. In that golden age the primary object of all Governments should be to ensure that a diet fully adequate for health was available to every individual so that he might be able to realize his full capacity for mental and physical fitness. In spite of the preoccupation of national energies in war, the work towards this great objective should by all means be pursued.

In the earlier part of his lectures Sir John Orr said that surveys which had been made in different parts of the world had revealed that people of all nations and classes were on diets which were in some way deficient. On the other hand, medical research had discovered a great new "gold reef" of knowledge with regard to protective foodstuffs. Therefore the campaign had shifted to the economic and educational fields to ensure that these foodstuffs, which were relatively expensive, were made available to the whole community, and to bring the knowledge of them into every household. In this connexion he gave a word of high praise to the British Medical Association on its campaign, started six years ago, towards better nutrition, and for all that its Nutrition Committee had done, by conferences and other means, to instruct both the medical profession and the lay public. As a result of the "big push" in nutrition, through the education of the public, the raised standard of living, the efforts to keep the cost of essential foods low, as well as through various public health measures, notably the provision of milk for school children, the common diet in this country had improved out of all recognition. The striking fall during the last ten years in the infant mortality rate and the tuber-

culosis rate and the considerable disappearance of deficiency diseases among children must be attributed largely to this cause. Sir John Orr thought that the medical profession deserved great credit for what had been done. It was the profession, especially those members of it who were engaged in preventive medicine, which was able effectively to apply the new knowledge. It was sometimes said that the better health of the people meant the disappearance of the doctor. That was not the case at all. It would require a larger number of doctors, exercising a higher degree of skill, and spending more time over their work, to ensure the prevention of disease and the detection of the earliest deviations from normal health than it would require to deal with gross diseases once these had developed.

THE KENNY TREATMENT OF POLIOMYELITIS

The Kenny method of treatment of infantile paralysis was subjected to a thorough test at the Queen Mary's Hospital, Carshalton, in 1937–8.[1] A report by Mr. Kenneth Starr[2] has now been published upon the experience gained in the Kenny Clinic and in the hospital at Newcastle, New South Wales. The conclusions do not differ appreciably from those of the Carshalton report. Seventy-five of the 114 cases referred to showed actual paralysis, and in some of them it was possible to carry out very early treatment even during the acute stage. The patient was rested in a standard position but without fixed splints, was kept very warm, and was treated by hot baths (without cold douches) and by active and passive movements so far as was possible without producing pain, these movements being given twice daily. The results claimed are a rapid abatement of pain and disappearance of muscle spasm, improvement in the muscle circulation, early return of full range of movement, and restoration of active movement in the non-paralysed muscles, together with diminution in the subsequent stiffness of the region affected. These results, if they are confirmed, are valuable, but unfortunately the amount of pain and muscle spasm varies greatly in different cases and in different epidemics, so that further experience is necessary. It is clear that the Kenny method does not lead to recovery which would not occur under other treatment. Its advocacy of the complete abandonment of splinting is not justified, but there is no doubt that in the hands of many orthopaedic surgeons splinting has been carried out too rigidly, with the result that movement and re-education have been delayed and stiffness increased. Miss Kenny's methods of hydrotherapy are good, but she does not take full advantage of the possibility of re-education of muscle in water. And she refuses to make use of the re-education board as a method of exercising muscles with the elimination of gravity. Mr. Starr's report criticizes strongly Miss Kenny's advocacy of early weight-bearing. Her claim is that this helps to restore muscle function. It is, however, contrary to the principles that have been advocated by most authorities, and there is no doubt that weight-bearing before the muscles are prepared for it may actually delay recovery, quite apart from the risk of damage to joints. It is rather remarkable in this connexion that the report does not refer to the use of supporting appliances. An interesting reference to muscle stiffness suggests that in this there is, first, oedema of the muscle followed by fibrocellular reaction with adaptive shortening, leading to a definite fibrosis. In the Kenny method this is combated by stimulation of the circulation by hydrotherapy and hot fomentations and by active and passive movement. According to this report these movements have a very definite success; in this one respect it is not altogether in accordance with the experience at Carshalton. The muscular stiffness is seen in muscles which are incompletely paralysed and have potentialities of recovery. It seems to be independent of splinting or immobilization, occurring sometimes in cases in which this has never been used, and its duration appears to be little affected by treatment. The Kenny method, like so many that are alleged to be new, includes points that are proving good and others that are not. It has acted as a stimulus to further work and made those who are concerned with the treatment of infantile paralysis review and revise their methods and organization. In this way it has undoubtedly led to improvement.

[1] *British Medical Journal*, 1938, **2**, 841, 852.
[2] *A Report to the Minister for Health, N.S.W., on Sister Kenny's Method of the Treatment of Infantile Paralysis.* By Kenneth W. Starr, M.B., B.S., F.R.C.S., F.A.C.S.

PREGNENINOLON

Earlier this year we discussed in these columns[1] the chemistry and first clinical reports on the use of an orally active form of progesterone which had been discovered by Inhoffen and Hohlweg,[2] and to which the name "pregneninolon" had been given. In a series of more extensive biological investigations at the National Institute for Medical Research, Hampstead, Emmens and Parkes[3] find that, as with so many of the sex hormones and analogous chemical compounds, pregneninolon is remarkably versatile in its actions. It is equally effective when given by the mouth or subcutaneously in producing progestational changes in the uterus of the immature or ovariectomized rabbit previously sensitized by injections of oestrone. Moreover, it exerts a trophic effect on the non-sensitized uterus of the immature or ovariectomized rat or mouse. This metrotrophic action is similar to that of oestrone and testosterone, and it is not altogether surprising to note that, according to these authors, pregneninolon has an oestrogenic action on the vagina of the spayed rat or mouse and an androgenic action on the comb-growth of the capon. They find that only in the case of its oestrogenic activity is pregneninolon less effective by the mouth than by injection. Quantitatively pregneninolon is ten times less powerful than progesterone in bringing about the progestational changes in the uterus of the rabbit. As an oestrogen it is about 3,000 times less active than oestrone, and as an androgen sixty times less active than androsterone. The probable effect of pregneninolon on the human subject is difficult to assess from these results, since it is well known that there is a large variation in the response of different species to oestrogens and androgens which is in no

[1] *British Medical Journal*, 1939, **1**, 1040.
[2] *Naturwiss.*, 1938, **26**, 96.
[3] *Nature*, 1939, **143**, 1064.

way related to the differences in body weight. Also the varied solvents that were used would effect the quantitative response. It appears, however, that the clinical doses of pregneninolon are unlikely to have oestrogenic action, and that the possibility of androgenic effects must be considered. Only further clinical experience can decide whether pregneninolon medication over long periods will have such undesirable results. Emmens and Parkes throughout their paper refer to pregneninolon as anhydro-oxy-progesterone; it has also been referred to as ethinyl-testosterone. Such a multiplication of nomenclature is to be deprecated. The name "pregneninolon" was given to this compound by the discoverers, Inhoffen and Hohlweg, and this should be retained until a change, if desirable, is agreed upon internationally. The term "anhydro-oxy-progesterone" is also misleading in that it uses the German prefix -oxy rather than the usual English -hydroxy.

BOOK ON WAR SURGERY

The articles appearing each week, from April 15 of this year until the present issue, on the treatment of war wounds and air raid casualties, have been read with close interest and approval both in this country and in the Dominions and Colonies, as is evidenced by the numerous letters we have received, some of which have appeared in our correspondence columns. There have been many requests that the series should be reprinted in book form, and before the outbreak of war steps were taken to put this in hand. Publication has been undertaken by Messrs. H. K. Lewis and Co., Ltd., 136, Gower Street, London, W.C.1, and the volume will be on sale in about a week's time or less (price 10s. 6d.). The early papers in the series were based on lectures delivered at the British Postgraduate Medical School, and these were followed by supplementary articles, contributed by invitation, on psychological casualties, on the medical aspects of chemical warfare, and two articles contributed by medical officers of the Ministry of Health on the organization of the emergency medical services. That on the organization of aid posts proved to be highly topical, and much interest has been shown in the two contributions on war surgery in Spain. War or peace, the essential unity of surgery remains, and the volume now to be published should be looked upon as a companion to the third volume of *Treatment in General Practice*, on anaesthesia and surgery. The surgical series will be resumed in our next issue.

COMPARATIVE MEDICINE

Dr. Louis Bory belongs to the very small band of practising physicians who have taken an interest in the diseases common to both the human race and other animals. A distinguished dermatologist in the first place, it is now many years since he was struck by the importance of comparing the skin diseases of animals with those of mankind, and to that end became an assiduous student at the great French Veterinary College of Alfort. Three years ago, in collaboration with Professor Henry of that institution, he published an essay on comparative dermatology which has had the honour of being included in the Nouvelle Pratique Dermatologique, the great achievement of the French School, which centres round the Hôpital Saint-Louis. He has now produced a more comprehensive work on comparative medicine in which not only cutaneous but diseases affecting other organs are discussed.[1] He includes in his survey both those disorders which attack the animal world spontaneously and those which are inflicted on it by physiologists and pathologists in their search for the solution of some problem of human medicine. Dr. Bory emphasizes the essential unity of human and animal pathology—a unity which is usually neglected by the practising physician, perhaps with some justification, for the modern medical education is sufficiently comprehensive and exhausting without adding to it a course of instruction in veterinary science; but there is no doubt that he is right in saying that every medical man who decides to dedicate himself to research should spend no inconsiderable time in the study of animal and indeed also of vegetable disease. His monograph is gracefully written and deserves to be read by all who are interested in the philosophy as well as in the practice of medicine.

BRITISH SPAS IN WAR TIME

The exigencies of war have, as is well known, placed the spas in a difficult position, and the executive of the British Spas Federation met on October 17 to consider the situation. The British spas are maintaining their bathing establishments in full working order. All treatments and the services of the trained staffs are available as usual. The taking over of spa hotels, which has been the subject of such severe criticism, immediately placed invalids in a very serious position. All the British Spas—Bath, Bridge of Allan, Buxton, Cheltenham, Droitwich, Harrogate, Leamington, Llandrindod Wells, Strathpeffer, and Woodhall Spa—have made arrangements for dealing with difficulties of accommodation, and, contrary to what may perhaps be thought, it is usually possible to meet the requirements of prospective "cure visitors." Such invalids should communicate with the director or manager of the spa they require, or if in further doubt or difficulty with the honorary secretary of the British Spas Federation, either at the Pump Room, Bath, or at the Travel Association Information Bureau, 28, Cockspur Street, London. At no time have the facilities provided by the spas of Britain been more needed. In their equipment and organization and in their general character as health centres the spas have a unique contribution to offer towards maintaining the health of the civil population, and later in restoring the wounded and invalided.

The William Mackenzie Memorial Lecture, on perimetry and the visual pathway, will be delivered by Dr. H. M. Traquair in Faculty Hall, 242, St. Vincent Street, Glasgow, to-day (Saturday, October 28) at 4 p.m. Sir Robert Wilson, president of the Glasgow Eye Infirmary, will take the chair, and Dr. John Henderson, President of the Royal Faculty of Physicians and Surgeons of Glasgow, will present the Mackenzie Memorial Medal to Dr. Traquair.

[1] *Clinique et Pathologie Comparée*. By Dr. Louis Bory. Paris: Masson et Cie. (50 fr.)

WAR WOUNDS AND AIR RAID CASUALTIES

The following article is a supplement to the lectures on war wounds and air raid casualties. It completes the series, which will now be reprinted in book form

DETONATION OF HIGH EXPLOSIVE IN SHELL AND BOMB, AND ITS EFFECTS

BY

DAVID DALE LOGAN, D.S.O., M.D., F.R.F.P.S.G., D.P.H., M.I.M.E.

Lieutenant-Colonel, R.A.M.C. (Ret.)

PART II

When shells and bombs burst in the open carbon monoxide, with its specific gravity of 0.96 (slightly lighter than air), is quickly dissipated, which makes it useless in offensive gas warfare. In deep trenches under favourable (that is, dull heavy) atmospheric conditions, violent and prolonged bombardment may cause a collection of CO high enough to cause poisoning. British, French, and German observers have proved this by finding CO in the blood of men killed or wounded during the shelling and by observing symptoms of poisoning—headache, giddiness, sickness, loss of consciousness—in a number of those exposed. These symptoms were generally regarded by the men as the result of the noise and the shock of shells bursting in their vicinity. Carbon monoxide has also been discovered in the blood of men killed by the bursting of shells which, though close to them, had caused no apparent wounds, and in the blood of men found in a state of shock under similar conditions. This has been confirmed by French and German investigators.

CO Poisoning from Detonation

Before it was generally recognized that CO poisoning in dugouts and in other enclosed places may follow dense salvos of high-explosive shells, cases of fulminant gas poisoning from detonation of heavy shells, used in 1916 on a vastly increased scale, gave rise to the belief that the different combatants were using a new asphyxiating gas. This idea was strengthened by the fact that all respirators then, as now, gave no protection against carbon monoxide. In a German pamphlet, issued as late as 1918, it was found that the enemy felt it necessary to allay fears prevalent among their troops that the Allies were using a new gas. "The use of special poison gas by the enemy—for example, prussic acid—has not, up to the present time, been definitely confirmed. Cases of death attributed to prussic acid are mostly due to carbon monoxide poisoning."

A shell or bomb bursting in or near a confined place produces large quantities of irrespirable gases which may displace the oxygen content of the atmosphere. In those exposed death may occur very quickly from the deprivation of oxygen as well as from the inhalation of carbon monoxide, the action of which, under these conditions, becomes intensified. Indeed, in such circumstances death may be instantaneous. In dugouts groups of men were frequently found dead, overwhelmed by gas before they were able to make a movement. German officers were found dead while playing chess, one dying just as he was making a move. The sole cause of death in those who were found in dugouts at a distance from the burst was carbon monoxide. During the war a writer in the *British Medical Journal*, discussing these sudden spectacular deaths in dugouts, held that in a number "the true cause was the sudden snatching away of the atmosphere pressure in and around the bodies by the voracious vacuum suddenly produced without." The explanation of this will follow later.

Thousands of soldiers have been poisoned by gas from shells bursting in or near the entrance to dugouts, subways, or cellars, which, under the conditions, ceased to give effective shelter and became mere death traps. Many examples were afforded during the Somme offensive in 1916 and during the French and British offensives of 1917. The following classic examples will give some idea of the dangers:

The Cumont-Mort-Homme tunnel, occupied by the Germans, accommodated brigade headquarters, two battalion headquarters, an aid post, and a kitchen. During the French bombardment both tunnels became crowded with wounded and stragglers from various units. The bombardment blocked all the entrances, and the galleries were flooded with fumes from the high-explosive shells, which asphyxiated most of the occupants, a considerable number of whom died. Six hundred survivors were taken prisoners.

The Tunnel Cornillet, held by the Germans, was composed of three galleries each a thousand feet long and eleven feet broad. There was an exit from each gallery. Ventilation was obtained from hand fans and from a number of ventilating shafts in the roof. There was accommodation for three battalions. During the French attacks salvos of shells bursting near the entrances, already sealed by the explosions, gassed the pioneers and prevented them freeing the entrances. Next day a large shell penetrated the tunnel doing great damage, and another came through the ventilating shaft. Many of the garrison were poisoned by carbon monoxide, and a large number died. The rest were so demoralized that no attempt was made to clear the entrances. Many prisoners were captured. In this case very few deaths were caused by direct violence. The vast majority were the result of gas poisoning.

How Such Accidents were Prevented

In modern trench warfare and aerial warfare adequate underground protection is all-important. The British defence on Givenchy Ridge in April, 1918, forms an excellent example of how the effects of intense shell fire on dugouts may be combated and supports Professor Haldane's plea in *A.R.P.* for deep underground protection.

Several attempts were made by the enemy to capture the Ridge, each attack being preceded by heavy shelling, which, however, failed to crush the entrances to the deep dugouts. Three of the entrances were protected by ferro-concrete monoliths, each with a minimum thickness of four feet; one entrance was in a cellar strengthened by rails and a bursting course, and three other entrances were covered by elephant shelters with a triple course of rails and five feet of broken bricks as a bursting course. Gas, either from explosives or from gas shelling, was prevented from gaining admission to the dugouts by efficient gas curtains and gas doors. The troops were thus perfectly safe, as was abundantly proved by the success of the counter-attacks which cleared the enemy off the high ground.

Gas from the detonation of shells, bombs, mobile charges, minenwerfers, etc., has been known to gain an entrance into cellars and dugouts at some distance from the burst through fissures in the strata or through cracks in the walls of the buildings. In an intensive bombardment by heavy shells or by bombing, the ground in the affected area may become saturated with gas. This is more likely to occur if there has been imperfect detonation of the explosive, or if heavy shells and bombs with time-fuses have penetrated so deeply that when detonation occurred no craters formed. In all these cases gas may find its way into cellars, basements, or dugouts by percolating through the porous ground or through crevices formed in the ground. It is well to remember that when

gas percolates through soil it loses its distinctive odour and becomes all the more insidious.

On the Western front hundreds of deaths from CO poisoning resulted from the detonation of mobile charges used for destroying dugouts and subways. The following is a good example of what happens, and it also shows the great value of efficient rescue work.

Preliminary to a hostile raid there was an intense bombardment of the British front line trenches. The ventilation of the infantry tunnel was seriously disturbed by the detonation of minenwerfers which crushed in two of the entrances. Shortly after shelling stopped the entrance to the shaft leading to the tunnel was blown in by a mobile charge brought over by the enemy raiding party. A demolition charge of our own which was in the shaft mouth was fired by the action of the enemy charge. Of thirty-six men who were in the tunnel, twenty-five lost their lives by CO poisoning before they could be rescued. Mine-rescue men with apparatus were quickly on the scene and succeeded in rescuing and resuscitating eleven men, all of whom were unconscious and seriously affected. All these men required oxygen, most of them artificial respiration. In two cases oxygen administration was kept up for ten hours. All recovered. The enemy mobile charge which detonated our charge at the shaft mouth had given rise to large quantities of gas.

It is well to remember that very often more gas is given off when explosives in large quantity are fired in the open than when the explosive is fired after being properly tamped. The fact that ventilation, owing to the entrances having been previously crushed in, was defective would accentuate the action of CO, and the presence of even small percentages of CO would, under such conditions, have serious consequences.

Many cases similar to the above were caused during the frequent British raids on the enemy lines, the tunnellers, who accompanied the infantry, carrying over very heavy mobile charges of high explosives. Owing to the high concentration of CO in these cases, and to the difficulty of setting up good ventilation, the entrances having been destroyed, death would follow very quickly. In some places where there was incomplete detonation of the charges, nitrous fumes as well as CO were formed.

Cause of Death in Concrete Shelters subjected to Heavy Bombardment

Recently questions have been asked regarding the effect on the occupants of concrete shelters of severe concussion from the detonation of bombs. Although aerial bombing, owing to the considerable intervals between bursts, is entirely different from intensive bombardment by shells, it is interesting to recall some experiences during the war.

The nature of the ground on Messines Ridge, where there is a water-bearing sand about twenty feet below the surface, made the construction of dugouts impossible. Ferro-concrete shelters were therefore used and proved of the greatest value in resisting shell fire. A large proportion escaped serious damage, although the entrances were blocked. It is very questionable if the occupants of these concrete shelters could remain in a condition able to fight, or even to survive under repeated concussion from the bursting of heavy shells. It was quite common to find the occupants dead in shelters which had been hit, but not penetrated, by eight-inch shells. In these cases there was no question of gas. A number of these shelters in the village of Messines were practically intact, and yet the wood lining and everything inside was shattered into many pieces, showing that the concussion must have been terrific. Anyone who has experienced, as I have, machine-gun fire in a "pill-box" knows the painful effect the concussion has on the ears, and this would be many times less than the effect of heavy shells landing. Commotio cerebri would be caused by the intense vibrations being transmitted through the bony structures to the central system. Various methods were adopted to lessen the intensity of the shock, but without success. After their painful experience at Messines and Langemarck it was quite common for the enemy to leave the pill-boxes during heavy shelling and get into neighbouring shell holes, returning to the pill-boxes when the barrage lifted.

Immediate Effects of Detonation of High Explosives

It is very necessary to understand what happens when a large shell, trench mortar, bomb, or mobile charge explodes. Before considering this I should point out one great difference between shells and bombs or mobile charges. The high-explosive content of a projectile from a gun is greatly reduced by the thick walls of the shell which are necessary to withstand the shock of discharge. The mobile charge or the bomb, on the other hand, is nearly all high explosive.

When a charge of high explosive is detonated there is, first, an enormous expansion of gas. This is referred to as expansion, or explosive wave, or simply as blast, and corresponds to the French "vent du projectile." This is followed by another wave, a tremendous inrush of air, which has been variously described as recoil, suction, or aspiration. Sir Frederick Mott, from the various pathological findings, refers to the first as the wave of compression, and to the second as the wave of decompression. Some observers hold that the latter has even greater destructive action on the human body than blast.

It is not necessary in this article to describe the extraordinarily varied effects of bombing on buildings in cities and towns. This has been very vividly described and minutely detailed by Professor J. B. S. Haldane, John Langdon-Davies, and other writers from their recent experiences in the Spanish War. In order to illustrate the two explosive waves, let me quote Professor Haldane

Diagram of the Effects of an Explosive Wave

BODIES MAY BE FOUND WITHOUT EXTERNAL WOUNDS
ZONE OF MAXIMUM VIOLENCE
ALL LIFE DESTROYED
A
BODIES SHOW SIGNS OF VIOLENCE
POISONED BY CO. UNDER PRESSURE
B
C
COMMOTIO CEREBRI
PRODUCTION OF ORGANIC LESIONS IN THE CENTRAL NERVOUS SYSTEM
COMMOTIONAL SHELL SHOCK
NO SERIOUS LESIONS PRODUCED
NEUROSES
CO. POISONING IF THIS ZONE IS AN ENCLOSED SPACE
CO. POISONING IF THIS ZONE IS AN ENCLOSED SPACE

Note.—The size of the zones A and B will depend on the amount of explosive in shell or bomb.

in his most interesting and informative work, *A.R.P.*, which I advise all doctors to read. He describes how, when bombs burst in a Spanish street, the metal shutters of shops which had not been knocked down were sucked outwards, and when a bomb fell inside a house a large part of the shattered walls fell inwards.

By far the greatest number of casualties resulting from detonation of heavy H.E. shells and bombs is caused by flying pieces of shell, brick, stones, and debris, which are impelled at great velocity and may cause death hundreds of feet from the exploded bomb or shell. A considerable percentage of the casualties are caused by crushing, by burying, and by asphyxiation from the collapse of buildings, entrances to cellars, dugouts, etc. Inside the zone of maximum violence bodies may be torn

to pieces and mutilated by the force of the explosion. Men may be hurled by the force of the explosion and smashed against buildings or against the ground.

Wounds produced not by missiles but by the explosive waves may be produced (*a*) from without inwards, this due to the enormous compression and velocity of the gases (the explosive wave travels many times faster than the fiercest hurricane), or (*b*) from within outwards, during the recoil.

To give some idea of the intensity of the blast, Sir Frederick Mott, in his book *War Neurosis and Shell Shock*, quotes the American Medico-Military Report, which stated that an "aneroid showed that the explosion of one of these shells caused a sudden atmospheric depression of about 350 mm. of the mercury tube, corresponding to a dynamic pressure of about ten tons to the square yard."

There is no doubt that many cases of sudden death, where no wounds were found, were caused by the severity of the blow over the heart or epigastrium. Sir Frederick Mott believes that the enormous aerial compression "may be transmitted to the fluid about the base of the brain and cause shock to the vital centres of the floor of the fourth ventricle, causing instantaneous arrest of the function of the cardiac and respiratory centres." This, he held, explained many of the cases of sudden death where there were no visible injuries to the body. In describing a personal experience of his own during the war when he was in the vicinity of bursting shells Professor Haldane thought that death in some similar conditions might be due to paralysis of the breathing.

The second, from within outwards, explains the bursting open of cavities as well as the extensive and strange character of the wounds occasionally noticed in the vicinity of explosions. After the bursting of large shells, bombs, and trench mortars near dugouts or cellars, the parts of the body which would be affected by the suction are those which contain gas, and one would expect to find conditions similar to those produced in accidents in caissons but more exaggerated.

Langdon-Davies, in *Air Raid*, describes how many bodies were found which did not bear a mark of any wound. Mitchener and Cowell have also described similar casualties caused by bombs exploding in narrow streets. On post-mortem examination the lungs were found to be torn and the abdominal viscera ruptured. Early in the great war Adrian Stokes, the famous pathologist, described to me extensive haemorrhages in the lungs with no visible wounds. In the official *Medical History of the War* (vol i, p. 46), in describing the effect of a trench mortar bursting near a signal dugout in which two signallers were working, the contributor stated that

"nothing more was seen of either of these men except one of the lower extremities, which was hanging on the German wire about 150 yards away. It had been disarticulated at the hip-joint. The number of men who have completely disappeared during the war, and whose deaths have had to be presumed, suggests that these disruptive effects are by no means rare."

As I have already pointed out, a number of the deaths of occupants of dugouts, especially of those at a distance from the burst, were due to CO. This gas is most insidious in its action. A good example of this was afforded when, during the work of clearing the ruins in Ypres, the bodies of forty British soldiers were discovered in cellars in the Grande Place. Some of the bodies were badly mutilated; those in other parts of the cellar were lying in peaceful attitudes, obviously poisoned by the fumes from the detonation of a large shell.

In experiments carried out in France to discover the effect of detonating 20-lb. charges of ammonal in dugouts, dogs were placed in various positions in these dugouts. Those within the zone of maximum violence were blown to pieces or killed outright by the force of the concussion without showing any injuries, while at a distance some were killed by CO and others seriously affected by it. This is very similar to experiences in the trenches when canisters of high-explosive demolition charges were used to drive out the occupants of dugouts.

Although I have pointed out some of the dangers of shells, bombs, and mobile charges bursting in or near dugouts, cellars, buildings, etc., it must be remembered that in modern warfare life would be impossible without adequate underground shelters, and that these undoubtedly saved many thousands of lives during the great war. In an article in the *Spectator* in February, 1939, I pointed out that

"the experience of the war and recent experiences in Spain proved that nothing so quickly gives confidence and allays panic in heavy bombardment by high-explosive shells and bombs as the provision of efficient underground shelters. The imperative duty of the Government is the adequate provision of large underground bomb-proof shelters in those cities and towns which are likely to be attacked. Underground accommodation for hospitals on a large scale should be commenced at once. The bombing by the Germans during the war of the crowded hospitals at Etaples may be remembered by many. I saw the ghastly results. Hundreds of the patients, doctors, nurses, and staff were killed or wounded."

These opinions, I may add, have in no way been affected by the last authoritative pronouncement on the subject, which rejected deep underground protection against bombing as unnecessary and undesirable, as well as being economically impossible.

OCCUPANCY TESTS OF AIR-RAID SHELTERS

"To every action there is an equal and opposite reaction." Thus the provision of air raid shelters for all follows on indiscriminate bombing by aeroplane. It is with a sense of relief that we have read the report of some detailed occupancy tests of shelters for factory workers.[1] Such a research indicates the standard of our preparedness. The tests were carried out between April 19 and May 22, 1939, by Messrs. J. and E. Hall, Ltd., in collaboration with some members of the medical profession and the Department of Industrial Physiology, London School of Hygiene and Tropical Medicine.

Shelters for Factory Workers

The shelters employed are of sufficient number and capacity to accommodate the whole staff of approximately 1,700 people. Two types of shelter are adopted—one of steel, completely below ground level, and the other of pre-cast concrete, only partly below ground level. The steel shelter is a standard shelter twenty-seven feet in length with a concrete floor five inches thick. The steel is surrounded by six inches of concrete, the topmost part of which is 1 ft. 9 in. below ground level. It is entered by means of a concrete stairway, through a gas-tight door at one end, and an alternative exit is provided at the other end by means of a gas-tight trap-door reached by a step-ladder. The pre-cast concrete shelter, which is also twenty-seven feet in length, has its concrete floor approximately five feet below general ground level, and the slabs of concrete above earth level are covered with two feet of excavated earth. Both shelters have seating accommodation for fifty occupants, and they are comfortably fitted out with, among other things, electric light, wireless installation, and telephonic communication. The gross cubic capacity per person when full is 24.2 cubic feet

[1] *Report on Occupancy Tests of Air Raid Shelters for Factory Workers.* (Pp. 27; 3 folding diagrams. 2s. net.) London: H. K. Lewis and Co.

for the steel shelter and 27.8 cubic feet for the concrete shelter.

The tests prove that these shelters can be fully occupied for a period of two hours without ventilation and with exits and entrances sealed against gas without any serious effects on the occupants, although some discomfort and mental impairment may be apparent towards the end of this period. As it will not be necessary to close the gas-proof doors until a gas alarm is given the natural ventilation thereby permitted is enough to maintain comfortable conditions inside the shelters. Further, it is found that discomfort due to heat and moisture accumulation does not arise in a period of two hours, even though no ventilation is provided in the fully occupied shelter. The earth surrounding the shelter keeps the walls cool, and moisture condenses on their surfaces.

Concentration of Carbon Dioxide

It is observed that there is less likelihood of unpleasant concentration of carbon dioxide developing in sealed concrete shelters than in steel shelters; this may be due to the permeability and/or absorbing capacity for carbon dioxide possessed by concrete. After two hours in the sealed-up steel shelter the carbon dioxide percentage is 5.2 compared with 4.3 in the concrete shelter. If it is essential that the individuals in a fully occupied and sealed-up shelter should retain their full mental alertness it is desirable that either artificial air filtration and ventilation should be maintained or adequate oxygen should be liberated at hourly intervals and carbon dioxide continuously partially absorbed by chemicals, such as soda lime, exposed in suitable containers and locations. When no oxygen is added or carbon dioxide removed symptoms appear in all subjects at the end of the second hour, marked panting (leading to thirst, dry mouth, and throat), headache, and lassitude being prominent. At this time the carbon dioxide percentage has increased to above 5, while the oxygen percentage has fallen from the normal figure of 20.9 to that of 14.75. Such a high percentage of carbon dioxide leads to panting, headache, vertigo, nausea, and lassitude, with vomiting as a possible after-effect, while the fall in oxygen percentage is regarded as being a cause of difficulty in mind concentration. When 40 lb. of soda lime are suspended, at the end of the first hour, in forty-seven gauze bags from hooks in a line stretching from end to end of the shelter about one foot below the centre of the arch of the roof, the final figure for carbon dioxide percentage is 3.8 in place of 5.32; a hand-operated fan is used to mix the air. With this reduction of carbon dioxide concentration symptoms are almost negligible.

The condition of the occupants in these sealed-up non-ventilated shelters corresponds to some extent with that of occupants of submerged submarines. Professor J. B. S. Haldane and his colleagues[2] have recently repeated and extended experiments originally started by his father, the late J. S. Haldane, in conjunction with the late Lorrain Smith. Professor Haldane's object was to endeavour to explain the difficulties facing the occupants of the ill-fated submarine *Thetis*. Here the carbon dioxide is regarded as having exceeded 6 per cent., and the results of Professor Haldane's experiments indicate that in each of six persons who have breathed air containing this concentration of carbon dioxide with normal or subnormal oxygen for an hour there has been an aggravation of symptoms other than panting when pure air or oxygen was again breathed, and three out of six vomited as an after-effect.

It is evident that if the occupants of the air-raid shelter described in Messrs. J. and E. Hall's report remain inside much longer than two hours the carbon dioxide would rise above 6 per cent. and similar aggravation of symptoms would be expected as an after-effect. These tests certainly give some indication of the concentration of carbon dioxide permissible in such sealed-up shelters, and the limit appears to be below 5 per cent. Further, the oxygen should not be allowed to fall to 15 per cent. if mental alertness is to be maintained.

[2] *Lancet*, 1939, **2**, 419.

Nova et Vetera

THE DIARIES OF PETER CAMPER

Peter Camper (1722–89) seemed to have left very slight traces on the sands of time. It was known that he was interested in midwifery, that he helped Smellie with some of the plates in the *Anatomical Tables*, that he modified a pessary, was an ardent supporter of symphysiotomy, and was successively a professor in the Universities of Franeker, Amsterdam, and Groningen. The plaque made by Josiah Wedgwood preserves for us his personal appearance. The Netherlands *Opuscula Selecta* now publishes the diaries—hitherto unknown—kept by Camper on his three visits to England, the first as a lusty young Dutchman in 1748, the second in 1752, and the third in 1785, when he was a foreign Fellow of the Royal Society.[1] His first visit was made to attend the lectures of Smellie, who was revolutionizing the teaching of midwifery, and of these lectures Camper gives a detailed account, telling of the wealth of material—both living and dead—by which they were illustrated.

But Camper was much more than a man-midwife; he had ample means and first-rate introductions. These he used to the greatest advantage, and, being an encyclopaedist, young, and of a pleasant personality, he went everywhere and knew everyone worth knowing in London. Nothing came amiss to him, and he could hold his own in discussions on comparative anatomy, fossils, books, and pictures. All this he sets down in his diaries, and shows that he was outspoken without giving offence, for when he did not like a thing he said so. His diaries are full of detail, and give a striking picture of English thought and manners in the Hanoverian period: the routes he took in his various journeys, what they cost, the distance and the time they occupied—even such intimate details as "The Fountain Inn in Catherine Street on the left hand where girls can be obtained," and added in pencil, "Mis Jackson at the Tallow Chandlers, Charles Street, Covent Garden."

The diaries for the most part are written in Dutch, which, in accordance with the custom of the previous volumes issued by the Netherlands Society, have the Dutch on one page and an English translation facing it. They are edited by Dr. W. Th. Nuyens, who is to be very heartily congratulated on the completion of his task. He has not only written a full and excellent introduction, but he supplies eleven plates and drawings, adding an appendix of biographical notes on Camper's many friends and acquaintances. An index alone is wanting.

MEDICAL HISTORY OF GUY DE MAUPASSANT

In his thesis (*Thèse de Paris*, 1939, No. 324) on the psychopathology of Guy de Maupassant Dr. Guillaume Delpierre relates that this celebrated writer, who was born in 1850, died of general paralysis in 1893. He contracted syphilis between the ages of 25 and 30, but apart from severe headaches from which he suffered from the age of 26, he did not show any symptoms until 1886, when he presented inequality of the pupils, facial tremor, and dysarthria. It was not until three years later, according to Dr. Delpierre, that general paralysis had a pronounced influence on his work, but while his productive activity diminished his style still remained clear. It was only in January, 1892, or about eighteen months before his death, that after attempted suicide he became an inmate of Dr. Blanche's private asylum, to which he had taken his brother three years previously. Maupassant came of a neuropathic family, and this fact, combined with the cerebral hyperactivity, as shown by his producing twenty-seven volumes in ten years, and physical over-exertion of all kinds, contributed, along with syphilis, to the development of his psychosis.

[1] *Opuscula Selecta Neerlandicorum de Arte Medica.* No. 15. *The Diaries of Peter Camper.* (Pp. 264; 11 plates, 6 drawings. 2.25 dollars.) Amsterdam: Nederlandsch Tijdschrift voor Geneeskunde. 1939.

FOREIGN PHARMACEUTICAL PRODUCTS

BRITISH EQUIVALENTS AND ALTERNATIVES

In time of war it may prove increasingly difficult to obtain supplies of pharmaceutical products of foreign origin, whether from enemy, neutral, or allied countries. The country must depend primarily on its own resources. These are far more extensive than is generally realized, while special steps have been taken during recent months to meet the possible deficiencies in an emergency. The schedule printed below has been prepared by the Association of British Chemical Manufacturers in order that the medical profession may be made fully aware of the British sources of supply for products which are available in replacement of foreign proprietaries. The information on which the correlation of foreign and British products is based in the schedule is, for the most part, generally available in other published works. While every effort has been made to ensure accuracy, the association cannot accept responsibility for the information it has obtained from these sources.

Steps have been taken to ensure that a number of essential medicinal proprietaries, hitherto imported, will be manufactured as soon as possible in the United Kingdom. Arrangements will be made, by the issue of revised editions of this schedule and otherwise, to announce these developments as they come to fruition, as well as generally to extend the scope of the information contained herein. The Association of British Chemical Manufacturers will welcome observations and suggestions from those who use this schedule, and will be glad at all times to assist in ascertaining for inquirers the British sources of supply in cases of difficulty.

At least one well-known firm of suppliers of products which we understand have hitherto been imported from abroad has announced that stocks which should satisfy normal requirements for a period are available, and that the firm has made arrangements to obtain further supplies manufactured in the U.S.A. Nevertheless it has been considered desirable to include certain of the firm's products in the list in case supplies should run short.

Note.—Bound copies of the complete schedule are available gratis on request to the Association of British Chemical Manufacturers at the address shown below.

166, Piccadilly,
London, W.1.
September, 1939.

KEY

A & H = Allen and Hanburys Ltd.
S A S = Stafford Allen and Sons Ltd.
Boots = Boots Pure Drug Co. Ltd.
B C = British Colloids Ltd.
B D H = British Drug Houses Ltd.
B'ton = Brotherton and Co. Ltd.
B W = Burroughs Wellcome and Co.
W J B = W. J. Bush and Co. Ltd.
Evans = Evans Sons Lescher and Webb Ltd.
Gen = Genatosan Ltd.
G. Chem = General Chemical and Pharmaceutical Co. Ltd.
Glaxo = Glaxo Laboratories Ltd.
G S = Graesser Salicylates Ltd.
H & W = Hopkin and Williams Ltd.
Howards = Howards and Sons Ltd.
Johnsons = Johnson and Sons (Manufacturing Chemists) Ltd.
Kemball = Kemball, Bishop and Co. Ltd.
Laporte = B. Laporte Ltd.
J F M = J. F. Macfarlan and Co.
M & B = May and Baker Ltd.
M C = Monsanto Chemicals Ltd.
Morson = Thomas Morson and Son Ltd.
T & H S = T. and H. Smith Ltd.
Whiffen = Whiffen and Sons Ltd.

Note.—The letter (I) following the name of a British maker and/or supplier means that the material is imported.

The British products shown can be supplied in all the forms (powder, tablet, ampoules, etc.) appropriate for each.

Column 2 gives the British product/s having the same essential composition as the item in column 1. Column 4 gives the British product/s having similar therapeutic properties and capable of replacing the product in column 1.

1 Foreign Product	2 British Product	3 British Maker and/or Supplier	4 British Product	5 British Maker and/or Supplier
Acecoline	Acetylcholine chloride	B D H B W Evans		
Acidol pepsin	Betaine hydrochloride and pepsin	Boots (I) B D H (I) Evans (I)		
Adalin ..	Carbromal B.P.	A & H (I) Boots (I) B D H (I) Evans (I) M & B (I)		
Afenil ..	Calcium chloride and urea	B D H Evans		
Agurin ..	Theobromine and sodium acetate	Boots B D H Evans M & B T & H S Whiffen		
Airol ..	Bismuth oxyiodogallate	Boots B D H B W Evans M & B T & H S Whiffen		
Albargin			Silver proteinate B.P.	A & H (I) Boots (I) B D H (I) B W (I) Evans (I) Johnsons J F M (I) M & B (I)
			Collosol silver	B C
Algodorm			Barbitone and amidopyrine tablets B.P.C.	A & H (I) Boots (I) B D H (I) Evans (I)
Allochrysine			Gold succinimide Collosol gold sulphide Myocrisin	B C B C M & B
Aluoin ..	Diamorphine	J F M M & B T & H S		
Alypin ..	Amydricaine hydrochloride	Evans (I)		
Anaesthesin	Benzocaine B.P.	A & H (I) Boots (I) B D H (I) Evans (I)		
Antileprol			Moogrol. Iodized moogrol. Alepol.	B W
			Ethyl chaulmoograte	B D H
			Ethyl esters of hydnocarpus oil B P.	S A S B D H Evans
Antiphlogistine	Kaolin poultice B.P.	A & H S A S Boots B D H Evans Johnsons T & H S		
	Colloplasma	B C		
Anusol suppositories			Supp. hamamelin co.	Evans
			Anusan suppositories	A & H
			Kaolin suppositories	B C
			H.P. suppositories	Boots (I)
			Sanusin sempules	B D H
			Enule hazeline co.	B W
Aperitol	Phenolphthalein B.P.	A & H Boots B D H Evans M & B M C Morson		
Aphrodine	Yohimbine	B D H (I) Evans (I) Johnsons (I)	Yohimbine hydrochloride	J F M (I)

1 Foreign Product	2 British Product	3 British Maker and/or Supplier	4 British Product	5 British Maker and/or Supplier
Arcanol..			Cinchophen and aspirin	Boots B D H Evans
Argyrol	Silver vitellin	Boots (I) B D H (I) Evans (I) J F M (I) M & B (I)	Collosol silver	B C
	Arvitin	Johnsons		
Aristochin			Quinine ethyl carbonate B.P.	A & H (I) Boots (I) B D H (I) B W (I) Evans (I)
Aristol ..	Thymol iodide	A & H Boots B D H Evans G. Chem Howards M & B Whiffen		
Arrhenal	Disodium methyl-arsenate	B D H Evans	Soamin	B W
Arsen-triferrin			Iron and arsenic ampoules and/or tablets	A & H Boots B D H B W Evans Glaxo
			Collosol iron and arsenic	B C
Aspiphenin			Aspirin and phenacetin	A & H Boots B D H B W Evans Howards
Asthmolysin			Pituitary extract and adrenaline	A & H Boots B D H Evans
Atocin ..	Cinchophen B.P.	A & H Boots B D H B W Evans Howards		
Atophan	Cinchophen B.P.	A & H Boots B D H B W Evans Howards		
Atophan balsam	Ung. agotan co.	Howards	Analgesic balm	Evans
			Analgesic cream (vanishing)	B D H
			Regesan pain relieving balm	Boots
			Menthofax	B W
Atophanyl			Cinchophen and sodium salicylate	Boots B D H Evans
Atoxyl ..	Soamin Sodium arsanilate	B W Evans M & B		
Aurobin	Crisalbine	M & B		
Bayer 250	Antrypol	B D H		
Betaxin ..	Vitamin B_1	A & H B C B D H B W Evans Glaxo M & B		
	Berin	Glaxo		
Bioferrol			Hepol with iron	A & H
			Livron	Boots
			Crookes liver iron	B C
			Heprona. Hepatex with iron	Evans
Bismarsen			Biarsamide. Bistovol	M & B
Bismogenol	Inj. bismuth salicylate B.P.	A & H Boots B D H Evans	Bisantol	M & B
Bismosalvan	Quinine iodobismuthate	A & H B D H Evans Whiffen		
	Quinostab Rubyl	Boots M & B		
Bitaemaine	Benzamine	Boots (I) B D H (I) B W Evans (I)		
Bivatol ..			Stabismol Neo-cardyl	Boots M & B
Bromural	Dormigene	A & H (I)	Carbromal B.P.	Boots (I) B D H (I) Evans (I) M & B (I)
Cafaspin			Aspirin and caffeine	A & H Boots B D H B W Evans Howards
			Crookes antipyretic cachet	B C
Calcimint			Calcium and vitamin D	B C
			Calsolact	A & H
			Calsimil	B D H
			Salpern	Boots
			Kalsolac	Evans
			Ostocalcium	Glaxo
Calcium diuretin	Theobromine calcium salicylate	Boots Evans T & H S Whiffen	Theobromine and sodium salicylate B.P.	A & H Boots B D H Evans M & B T & H S Whiffen
Calcium (Sandoz)			Calcium gluconate B.P.	A & H Boots B D H Evans Howards Kemball M & B
			Calcium laevulinate	B C
			Percalcin	Evans
			Levu-calcin (calcium laevulinate) ampoules	Glaxo
Calsiod ..	Calcium *o*-iodoxybenzoate	Whiffen	Calcium acetylsalicylate	Boots B D H Evans Morson
	Arthrytin	M & B		
Campolon			Hepol. Anahepol. Azoule liver extract	A & H
			Hepastab. Hepastab No. 2	Boots
			Anahaemin. Liver extract (intramusc. inj.)	B D H
			Hepatex comp. H.C.I.	Evans
			Examen	Glaxo
Cantan ..	Ascorbic acid B.P. (Vitamin C)	A & H Boots B C B D H B W Evans Glaxo	Natural vitamin C.I.	B C
	Celin	Glaxo		
	Planavit C	M & B		
Carboserin			Activated carbon	A & H Boots B D H Evans
			Charcoal and kaolin	Boots B C Evans
Cardiazol	Phrenazol	Boots	Anacardone Nicamide Cardatone Dacorene (For use as cardiac stimulant)	B D H B W Evans M & B

1 Foreign Product	2 British Product	3 British Maker and/or Supplier	4 British Product	5 British Maker and/or Supplier
Casbis ..			Inj. bismuth salicylate B.P.	A & H B D H Evans
			Metallic bismuth suspension	B C
			Stabismol	Boots
			Neo-cardyl	M & B
			Bisantol	M & B
Chinosol	Potassium hydroxyquinoline sulphate	A & H (I) Boots (I) B D H (I) Evans (I) J F M (I)		
	Soloid chinosol	B W (I)		
Chloretone	Chlorbutol B.P.	A & H Boots B D H Evans M & B Morson		
Cignolin			Chrysarobin B.P.	A & H Boots B C B D H B W Evans J F M M & B T & H S
Cito-baryum			Barium meal	Boots Glaxo
			Novumbrose. Umbrose	A & H
			Collosol barium sulphate	B C
			Shadoform	B D H
			Barolac	B W
			Fotonemal. Fotamealo. Fotamilko	Evans
Codeonal			Soluble barbitone and codeine	Boots (I) B D H (I) Evans (I)
Compral			Amidopyrine B.P.	Boots (I) B D H (I) B W (I) Evans (I)
Coramine (Ciba)	Anacardone Nicamide	B D H B W	Cardatone Dacorene	Evans M & B
Creosotal	Creosote carbonate	Boots (I) B D H (I) W J B Evans (I)		
Cryogenine			Phenylsemicarbazide	B D H (I) W J B Evans (I) M & B (I)
Cycloform			Benzocaine B.P.	A & H (I) Boots (I) B D H (I) Evans (I)
Cycloform ointment			Benzocaine, extract of hamamelis, and zinc oxide ointment	B D H (I)
			Ung. hamamelis co. Evans	Evans (I)
Cylotropin			Hexamine, sodium salicylate, and caffeine	B D H Evans
Dermatol	Bismuth subgallate	A & H Boots B D H B W Evans (I) M & B Morson T & H S		
Devegan	Acetarsol vaginal compound	Evans	Silver aluminate	B C
	Stovarsol vaginal compound	M & B		
Dial ..	Allobarbitone	A & H (I) Boots (I) B D H (I) Evans (I)		

1 Foreign Product	2 British Product	3 British Maker and/or Supplier	4 British Product	5 British Maker and/or Supplier
Digalen..			Digitalin granules	A & H Boots B D H Evans
			Diginutin	B W
Digipuratum			Digitalin granules	A & H Boots B D H Evans
			Tab. digitalis leaf B.P.	A & H Boots B D H Evans
			Diginutin. Digoxin	B W
Digitaline Nativelle	Digitalin granules	A & H Boots B D H Evans	Tabloid digoxin	B W
	Digitoxin	Boots J F M (I)		
	Tabloid digitalin cryst.	B W		
Dijodyl ..			Iodoprotein Iodicin Iodocasein	Boots B W Whiffen
Dionin ..	Ethylmorphine hydrochloride	A & H Boots B D H B W Evans J F M M & B T & H S		
Diuretin	Theobromine and sodium salicylate B.P.	A & H Boots B D H Evans M & B T & H S Whiffen		
Duotal ..	Guaiacol carbonate	A & H B D H B W W J B Evans M & B		
Eldoform			Albumin tannate	B D H Evans M & B
Elityran..			Thyroxine sodium B.P.	Boots B D H B W Evans
			Thyroid B.P.	A & H Boots B D H B W Evans
			Tabloid thyroxine	B W
Elixir Gabail			Elixir bromovalerianate	Boots Evans
			Euvalerol B	A & H B C
			Collosol bromoform co.	
			Elixir valibrom B.D.H.	B D H
Ephetonin*			Ephedrine hydrochloride	A & H Boots (I) B C B D H B W Evans J F M M & B T & H S
Esmodil..			Acetylcholine	B D H Evans
			Hypoloid acetylcholine bromide	B W
			Pragmoline	M & B
Esterol ..	Benzyl succinate	A & H B D H W J B Evans		
Eugallol..	Pyrogallol monoacetate	B D H Evans Johnsons		

* Ephetonin, a racemic mixture, is made from synthetic ephedrine, which has less therapeutic activity than the ephedrine (natural) shown as the British alternative.

1 Foreign Product	2 British Product	3 British Maker and/or Supplier	4 British Product	5 British Maker and/or Supplier
Euphthalmine	Tabloid ophthalmic euphthalmine hydrochloride	B W	Atropine sulphate B.P.	A & H Boots B D H B W Evans J F M T & H S Whiffen
			Homatropine hydrobromide	A & H Boots B D H B W Evans T & H S
			Silver with atropine	B C
Euquinine	Quinine ethyl carbonate B.P.	A & H (I) Boots (I) B D H (I) B W (I) Evans (I) Howards (I)		
Euresol ..	Resorcin monoacetate	A & H Boots B D H Evans		
Exalgin ..	Methylacetanilide	A & H Boots B D H Evans		
Faexalin Faexin			Dried brewer's yeast	A & H Boots B D H Evans
Femergin			Ergotoxine ethane sulphonate B.P.	B D H B W Evans M & B
Ferronyl	Citrated ferrous chloride B.P.	A & H B D H B W Evans Howards Johnsons	Ferosan Fersolate	Boots Glaxo
Fiatal ..			Female mixed glands	Boots B D H B W Evans
			Sexatones, female	Evans
Fibrolysin	Thiosinamine sodium salicylate	Boots B D H Evans	Iodolysin Thiosinamine ethyl iodide	A & H Boots B D H Evans Glaxo
Fouadin			Antimony sodium tartrate B.P.	Boots B D H B W Evans M & B
			Anthiomaline Collosol metallic antimony	M & B B C
Fraisse's ferruginous ampoules			Iron, arsenic, and strychnine ampoules	Boots B C B W Evans Glaxo
			F.N.S. Ferruginous compound ampoules	A & H B D H
Germanin	Antrypol	B D H		
Gonosan			Sandalwood oil and kava-kava resin	B D H Evans
			Kavol Savaresse's santal	A & H Evans
Gravitol			Ergotoxine ethane sulphonate B.P.	A & H Boots B D H B W Evans Glaxo
			Ergometrine B.P.	A & H B D H B W Evans M & B
			Erbolin Ernutin	Glaxo B W

1 Foreign Product	2 British Product	3 British Maker and/or Supplier	4 British Product	5 British Maker and/or Supplier
Hegonon			Silver proteinate B.P.	A & H (I) Boots (I) B D H (I) B W (I) Evans (I) Johnsons J F M (I) M & B (I)
			Collosol silver	B C
Helmitol	Formamol	A & H B D H Evans H & W	Cystazol	A & H
Hepatopson liq.			Liquid extract of liver B.P.	A & H Boots B D H B W Evans
			Hepol Hepatex Compound extract of liver	A & H Evans Boots
Hexal ..			Hexamine B.P.	A & H Boots B W B D H Evans J F M M & B
Hexophan			Cinchophen B.P.	A & H Boots B D H B W Evans Howards M & B
Hydropyrin	Lithium acetylsalicylate	A & H Boots B D H Evans Howards		
Hypertherman			T.A.B. vaccine B.P.	B D H B W Evans Glaxo
			Normal horse serum	A & H B W Evans
Hypophysin	Pituitary extract B.P.	A & H Boots B D H B W Evans Glaxo		
Ichthalbin			Ichthammol B.P.	A & H Boots B C (I) B D H Evans J F M
Ichthyol	Ichthammol B.P.	A & H Boots B C (I) B D H Evans J F M M & B		
Idozan ..			Dialysed iron	A & H B D H B W Evans
			Neo-ferrum Colliron	B C Evans
Impletol			Procaine hydrochloride and caffeine	B D H (I)
			Arecan spinal anaesthetic	Evans (I)
Inkretan			Thyroid and pituitary Thyrosex	Boots B D H Evans
Iod-calcium-diuretin	Potassium iodide and theobromine calcium salicylate	Whiffen	Potassium iodide and theobromine sodium salicylate	Boots B D H Evans Whiffen
Iodeikon	Iodophthalein B.P.	A & H B D H Evans		
	Stipolac Opacol. Opacin	B W M & B		

1 Foreign Product	2 British Product	3 British Maker and/or Supplier	4 British Product	5 British Maker and/or Supplier
Iodival			Iodoprotein	Boots
			Iodocasein	Whiffen
Iodipin ..	Iodized oil B.P.	A & H		
		Evans		
	Iodatol	B D H		
	Neo-hydriol	M & B		
Iod-tetra-gnost	Iodophthalein B.P.	A & H		
		B D H		
		Evans		
	Stipolac	B W		
	Opacol. Opacin	M & B		
Juvenin			Yohimbine, nux vomica, and damiana pills	B D H
			Damiana pills	Evans
Kalmo-pyrin	Calciumacetylsali-cylate	A & H		
		Boots		
		B D H		
		Evans		
		Howards		
		Morson		
Keraphen			Iodophthalein B.P.	A & H
				B D H
				Evans
			Stipolac	B W
			Opacol. Opacin	M & B
Krysolgan			Crisalbine. Myocrisin	M & B
Lacarnol			Adenosine	B D H
Larosti-dine	Histidine	A & H		
		B D H		
		B W		
		Evans		
	Stellidin	M & B		
Lenigaliol	Pyrogallol triacet-ate	B D H		
		Evans		
		Johnsons		
Lipiodol	Oleum iodisatum B.P.	A & H		
		Boots		
		B D H		
		Evans		
	Neo-hydriol	M & B		
	Iodatol (iodized oil 40%)	B D H		
Lopion ..			Crisalbine. Myocrisin	M & B
Luminal	Phenobarbitone B.P.	A & H (I)		
		Boots (I)		
		B D H (I)		
		Evans (I)		
		J F M (I)		
		M & B		
	Gardenal	M & B		
	Tabloid phenobar-bitone	B W (I)		
Luminal sodium	Soluble phenobar-bitone B.P.	A & H (I)		
		Boots (I)		
		B D H (I)		
		Evans (I)		
		J F M (I)		
		M & B		
	Gardenal sodium	M & B		
	Tabloid soluble phenobarbitone	B W (I)		
Magnesi-um per-hydrol	Magnesium perox-ide	A & H		
		Boots		
		B D H		
		Evans		
		H & W		
		Laporte		
		M & B		
Mapharsen			Neoarsphena-mine B.P.	Boots
				B W
				Evans
				M & B
			Novostab	Boots
			Neokharsivan	B W
			Halarsol. N.A.B.	M & B
Matronax			Ovary and thy-roid	Boots
				B D H
				Evans
			Thyro-varium	B W
Medinal	Soluble barbitone B.P.	A & H (I)		
		Boots (I)		
		B D H (I)		
		Evans (I)		
		J F M (I)		
		M & B		
	Tabloid soluble barbitone	B W (I)		

1 Foreign Product	2 British Product	3 British Maker and/or Supplier	4 British Product	5 British Maker and/or Supplier
Migrainin	Phenazone caffeine citrate	A & H (I)		
		Boots (I)		
		B D H (I)		
		Evans (I)		
		M & B (I)		
		T & H S (I)		
Myosal-varsan	Sulpharsphena-mine B.P.	Boots		
		B W		
		Evans		
		M & B		
	Sulphostab	Boots		
	Kharsulphan	B W		
	M.A.B.	M & B		
Naganol	Antrypol	B D H		
Neocaine	Procaine hydro-chloride B.P.	A & H (I)		
		Boots (I)		
		B D H (I)		
		B W (I)		
		Evans (I)		
		M & B		
		J F M (I)		
	Arecan	Evans (I)		
	Planocaine	M & B		
Neohydro-pyrin	Magnesium acetyl-salicylate	B D H		
	Magsyn	Evans		
		A & H		
Neo-oleo-sal			Inj. bismuth sa-licylate B.P.	A & H
				B D H
				Evans
			Stabismol	Boots
			Neo-cardyl	M & B
Neo-rear-gon			Silver proteinate B.P.	A & H (I)
				Boots (I)
				B D H (I)
				B W (I)
				Evans (I)
				Johnsons
				J F M (I)
				M & B (I)
			Collosol silver	B C
			Soloid silver proteinate	B W
Neosalvar-san	Neoarsphenamine B.P.	A & H		
		Boots		
		B W		
		Evans		
		M & B		
	Novarsan	A & H		
	Novostab	Boots		
	Neokharsivan	B W		
	N.A.B.	M & B		
Neostibo-san			Antimony sodi-um tartrate B.P.	A & H
				Boots
				B D H
				Evans
				M & B
			Collosol metal-lic antimony	B C
			Soloid antimony tartrate co.	B W
			Neostam	B W
			Anthiomaline	M & B
Neo-trépol	Inj. bismuth B.P.	A & H		
		Boots		
		B D H		
		Evans		
		M & B		
	Bismostab	Boots		
	Hypoloid bismuth metal	B W		
	Bisglucol	M & B		
			Metallic bismuth suspension	B C
Neutralon			Magnesium tri-silicate	A & H
				Boots
				B D H
				M & B
				T & H S
			Colloidal kaolin	B D H
				Evans
			Osmo-kaolin	A & H
			Lacto-kaolin	B C
			Collumina. Novasorb	Evans
Noctal ..			Phenobarbitone B.P.	A & H (I)
				Boots (I)
				B D H (I)
				Evans (I)
				J F M (I)
				M & B
			Gardenal	M & B
			Tabloid pheno-barbitone	B W (I)
			Soneryl	M & B

1 Foreign Product	2 British Product	3 British Maker and/or Supplier	4 British Product	5 British Maker and/or Supplier
Novalgin			Amidopyrine B.P.	A & H (I) Boots (I) B D H (I) B W (I) Evans (I)
			Sonalgin	M & B
			Amidopyrine salicylate	B D H (I) Evans (I)
Novasurol			Inj. mersalyl B.P.	A & H Boots B D H Evans
			Neptal	M & B
Novato-phan			Cinchophen B.P.	A & H Boots B D H B W Evans Howards M & B
Novocain	Procaine hydro-chloride B.P.	A & H (I) Boots (I) B D H (I) B W (I) Evans (I) M & B J F M (I)	Arecan	Evans (I)
	Planocaine	M & B		
Omnadin			T.A.B. vaccine B.P.	B D H B W Evans Glaxo
			Normal horse serum	A & H B W Evans
Omnopon	Papaveretum	B D H Evans		
	Alopon Opoidine	A & H J F M		
Orthoform	Orthocaine B.P.	A & H (I) Boots (I) B D H (I) Evans (I) M & B (I)		
Pandigal			Digitalin	A & H Boots B D H B W Evans J F M (I)
			Digoxin	B W
Panflavin			Euflavine	A & H Boots B D H Evans M & B
Panflavin tablets	Planacrine	M & B		
Pantocain			Procaine hydro-chloride B.P.	A & H (I) Boots (I) B D H (I) B W (I) Evans (I) M & B J F M (I)
			Beta-borocaine Arecan anaes-thetics Planocaine	B D H Evans M & B
Pantopon	Papaveretum	B D H Evans		
	Alopon Opoidine	A & H J F M		
Parathor-mone	Parathyroid extract Euparatone	Evans A & H		
Pellidol . .			Scarlet red oint-ment	A & H S A S Boots B D H Evans Johnsons M & B
Pentnu-cleotide	Pentide S.P.N. Evans	A & H Evans		
Perhydrol	Hydrogen peroxide 109 vols.	A & H Boots B D H Evans Laporte M & B		

1 Foreign Product	2 British Product	3 British Maker and/or Supplier	4 British Product	5 British Maker and/or Supplier
Petein . .	Whooping-cough vaccine	B D H B W Evans Glaxo		
Phanodorm			Allobarbitone	Boots (I) B D H (I) Evans (I)
			Soneryl	M & B
Progynon	Ovostab Oestroform Oestrinum	Boots (I) B D H Evans (I)	Stilboestrol	A & H Boots B C B D H Glaxo
			Clinestrol	Glaxo
Prolan . .	Physostab Antostab Gonan	Boots (I) Boots (I) B D H	Ext. pituitary anterior lobe	Evans
Proluton	Luteostab Progestin B.D.H.	Boots B D H	Corpus luteum	A & H Evans
Prominal			Phenobarbitone B.P.	A & H (I) Boots (I) B D H (I) Evans (I) J F M (I)
			Alepsin (for epi-lepsy)	B C
			Solantoin (for epilepsy)	Glaxo
			Rutonal	M & B
			Tabloid pheno-barbitone	B W (I)
Promonta			Casein glycero-phosphate	Boots B D H Evans Johnsons M & B Morson
			Bynogen Lecigen Sanatogen Farex	A & H Evans Gen Glaxo
Prontosil album	Sulphanilamide	A & H Boots B C B D H B W W J B Glaxo M & B M C Morson		
	Streptocide	Evans		
			Proseptasine. M & B 693	M & B
Prontosil rubrum			Sulphanilamide	A & H Boots B C B D H B W W J B Glaxo M & B M C Morson
			Streptocide Proseptasine. M & B 693	Evans M & B
Prontosil soluble			Soluseptasine Streptocide solu-tion	M & B Evans
Protargol	Silver proteinate B.P.	A & H (I) Boots (I) B D H (I) B W (I) Evans (I) Johnsons J F M (I) M & B (I)		
	Collosol silver	B C		
Pyoktanin violet	Methyl violet	A & H Boots B D H Evans		
Pyoktanin yellow	Auramine	B D H		
Pyramidon	Amidopyrine B.P.	A & H (I) Boots (I) B D H (I) B W (I) Evans (I) M & B (I)		
	Tabloid amidopy-rine	B W (I)		

1 Foreign Product	2 British Product	3 British Maker and/or Supplier	4 British Product	5 British Maker and/or Supplier
Pyramidon salicylate	Amidopyrine salicylate	A & H (I) B D H (I) Evans (I) M & B (I)		
Quadronal			Antipyrine, phenacetin, and caffeine	Boots (I) B D H (I) Evans (I)
Quadronox			Antipyrine, phenacetin, and barbitone	B D H (I) Evans (I)
Racedrin*			Ephedrine hydrochloride B.P.	A & H Boots (I) B C B D H B W Evans J F M M & B T & H S
Raminal ..			Theobromine calcium salicylate	A & H (I) Evans (I) Whiffen (I)
Sajodin ..			Iodoprotein Iodicin Iodocasein	Boots B W Whiffen
Salipyrin	Phenazone salicylate	A & H (I) B D H (I) Evans (I)		
Salit ..	Bornyl salicylate	B D H Evans M & B		
Salyrgan	Inj. mersalyl B.P.	A & H Boots B D H B W Evans	Neptal	M & B
Sanocrysin	Crisalbine	M & B	Gold succinimide Collosol gold sulphide	B C B C
Santyl ..			Sandalwood oil capsules	A & H Boots B D H B W Evans
			Savaresse's santal capsules	Evans
Selvarol ..	Calcium gluconate B.P.	A & H Boots	Calcium lactobionate	A & H
		B D H B W Evans Howards Kemball M & B	Calcium laevulinate (Laevulate)	B C B D H B W Evans
			Percalcin Levu-calcin (calcium laevulinate	Evans Glaxo
Sionon ..	Sorbitol	A & H B D H Howards M & B		
Solargentum			Silver proteinate B.P.	A & H (I) Boots (I) B D H (I) B W (I) Evans (I) Johnsons J F M (I) M & B (I)
Solganal			Crisalbine	M & B
Solganal B			Myocrisin (aqueous)	M & B
Solganal B oleosum			Myocrisin (oily)	M & B
Somnosal			Carbromal B.P.	A & H (I) Boots (I) B D H (I) Evans (I) M & B (I)
			Sonalgin	M & B
Spinocain			Procaine, strychnine sulphate, and alcohol	B D H (I)
			Arecan spinal anaesthetic	Evans
			Duracaine (procaine formula P.G.)	M & B

* Racedrin, a racemic mixture, is made from synthetic ephedrine, which has less therapeutic activity than the ephedrine (natural) shown as the British alternative.

1 Foreign Product	2 British Product	3 British Maker and/or Supplier	4 British Product	5 British Maker and/or Supplier
Spirobismol	Quinine iodobismuthate	A & H B D H Evans Whiffen		
	Quinostab Rubyl	Boots M & B		
Spirocid	Acetarsol B.P. Orarsan Kharophen Stovarsol	Evans Boots B W M & B	Leucarsone	M & B
Stypticin	Cotarnine hydrochloride	A & H Boots B D H B W Evans J F M M & B T & H S		
Styptol ..	Cotarnine phthalate	A & H Boots B D H Evans J F M M & B T & H S		
Styracol ..	Guaiacol cinnamate	B D H (I) W J B Evans (I) M & B (I)	Guaiacol benzoate	W J B
Sulfarsenol	Sulpharsphenamine B.P.	Boots B W Evans M & B		
	Sulphostab Kharsulphan M.A.B.	Boots B W M & B		
Superol ..	Potassium hydroxy quinoline sulphate	A & H (I) Boots (I) B D H (I) Evans (I) J F M (I) M & B (I)		
	Soloid chinosol	B W (I)		
Suprarenin	Adrenaline B.P.	A & H Boots (I) B D H (I) B W Evans (I) J F M (I) M & B (I)		
Tannalbin	Albumin tannate	A & H B D H Evans M & B		
Tannigen	Acetannin	A & H B D H Evans H & W M & B		
Tannoform	Methylene ditannin	B D H Evans M & B		
Theocin sodium acetate	Theophylline and sodium acetate B.P.	Boots (I) B D H (I) Evans (I) M & B (I)		
Theominal	Theobromine and phenobarbitone B.P.	A & H (I) Boots (I) B D H (I) Evans (I)		
	Theogardenal	M & B		
Thiocol	Potassium guaiacol sulphonate	A & H (I) B D H (I) W J B Evans (I)		
Thiocol syrup			Bronchial syrup Evans	Evans
Thyraden			Thyroid B.P.	A & H Boots B D H B W Evans
			Thyroxine sodium B.P.	Boots B D H B W Evans
			Tabloid thyroid	B W
Tiodine ..	Thiosinamine ethyl iodide	Boots B D H Evans Glaxo M & B		
	Iodolysin	A & H		

1 Foreign Product	2 British Product	3 British Maker and/or Supplier	4 British Product	5 British Maker and/or Supplier
Trikresol	Cresol B.P.	A & H Boots B D H Evans G S M & B M C		
Trional ..	Methylsulphonal B.P.	A & H (I) Boots (I) B D H (I) B W (I) Evans (I) M & B (I)		
Tutocain			Procaine hydrochloride B.P.	A & H (I) Boots (I) B D H (I) B W (I) Evans (I) M & B J F M (I)
			Planocaine Arecan	M & B Evans (I)
Uleron ..			Sulphanilamide	A & H Boots B C B D H B W W J B Evans Glaxo M & B M C Morson
			Streptocide M & B 693	Evans M & B
Unden ..	Oestroform Ovostab	B D H Boots (I)	Stilboestrol	A & H Boots B C B D H Glaxo
			Clinestrol	Glaxo
Urotropin	Hexamine B.P.	A & H Boots B D H B'ton B W Evans Johnsons J F M	Phospho-mandelate	B C
Valisan ..			Bornyl isova'erianate Menthyl valerianate	B D H Evans A & H B D H Evans M & B
Valyl ..			Bornyl isovalerianate	B D H Evans
Varicophytin	Hypertonic solution sodium chloride with anaesthetic	B D H Evans	Sodium morrhuate	A & H B C B D H B W Evans Glaxo
			Sodium salicylate B.P.	Boots B D H Evans
			Quinine and urethane	Boots (I) B C B D H
			Lithocaine. Episol Hypoloid sodium salicylate Varixol Ethamolin Varicaine	B C B W Evans Glaxo M & B
Veganin	Aspirin, phenacetin, and codeine phosphate	A & H Boots B D H Evans Johnsons M & B		
Veramon			Barbitone and amidopyrine	A & H (I) Boots (I) B D H (I) Evans (I)
			Sonalgin	M & B
Veronal	Barbitone B.P.	A & H (I) Boots (I) B D H (I) Evans (I) J F M (I) M & B		
	Tabloid barbitone	B W (I)		
Veronal sodium	Soluble barbitone B.P.	Boots (I) B D H (I) Evans (I) J F M (I) M & B		
	Tabloid soluble barbitone	B W (I)		
Vigantol	Liq. calciferol B.P.	A & H Boots B D H Evans Glaxo	Natural vitamin D concentrate	B C
	Viosterol Radiostol solution and pellets Ostelin	A & H B D H Glaxo		
Xeroform	Bismuth tribromphenate	A & H Boots B D H Evans Howards M & B Morson T & H S Whiffen		
Yatren ..	Chiniofon B.P.	B D H Evans		
	Quinoxyl Quiniosulphan	B W M & B (I)		
Zinc perhydrol	Zinc peroxide	B D H Evans H & W Laporte		

Reports of Societies

MALARIA IN WAR

Prophylaxis and Treatment

At a meeting of the Royal Society of Tropical Medicine and Hygiene on October 19, Sir RICKARD CHRISTOPHERS delivered his presidential address on the subject of "Malaria in War."

That there was a connexion between malaria and war, he said, was well recognized. It need not be supposed that the aetiological fundamentals were really different from those dealt with in civil life, but there were features of malaria when it occurred as a concomitant of war which were interesting and important enough to merit further consideration. In the first place, malaria in such circumstances might be much more than merely one of the causes of casualties from sickness; it might modify or even determine the results of a campaign. Again, the epidemiology of malaria in the Army in the field was likely to have features which were by no means necessarily those familiar in civil administration. Lastly, the questions of prevention and even of treatment were quite special in such a setting. Therefore there was a certain justification for the term "war malaria."

Previous War Experience

Turning to malaria in previous wars, Sir Rickard Christophers said that it was surprising that in classical writings concerning the movements of armed nations so little about the effects of malaria was to be found. Yet it was improbable, as some writers had suggested, that malaria was a relatively recent introduction in many countries. In wars since the Napoleonic era malaria did not figure very largely, except in the famous Walcheren Expedition of 1806 and the Chinese-Japanese War of 1897. In the Crimean War, 1854-6, it was not apparent, reading the *British Medical Journal* (or the *Association Medical Journal*, as it was called at that time) that there was a war on at all. In the South African War there appeared to have been only a slight amount of malaria, as also in the recent Italian-Abyssinian War.

The most important malaria experiences in the great war were those in Taranto, Macedonia, Mesopotamia, East Africa, and Palestine. Taranto came into prominence because it was realized early that troops proceeding to Egypt and other theatres of war were becoming infected even by a short stay at this port of South-East Italy. The Macedonian experience was one of the greatest medical surprises of the war, the total casualties from malaria being enormous. During the winter of 1916–17 a quarter of the whole force seemed to have been infected. In Mesopotamia the sickness from malaria was considerable, though not to be compared with the Macedonian incidence. One fact brought out was that admissions to hospital were but a small part of the actual malaria. All units in 1916–17 were supposed to be receiving prophylactic quinine, 5 grains a day; the only thing that could be said about quinine prophylaxis is that the incidence might have been heavier had it not been carried out. With regard to East Africa, the operations involved an average strength of about 50,000 troops, and the admissions for malaria in two years were estimated at 120,000. In Palestine, where in 1918 the troops suffered severely from malaria, vigorous anti-larval measures were carried out, marshes being drained, streams canalized, and wells and cisterns oiled. These and other anti-mosquito operations appeared to have reduced breeding to a minimum at a time when it might have been optimum.

Preventive Measures in the Field

The first measure of control was the constitution of a malaria inquiry laboratory. Without an adequate organization to ascertain the conditions and decide upon the steps to be taken, hopeless confusion could result. In the next place, whatever other measures might be adopted, the necessity for carrying out anti-larval operations would almost certainly arise, at all events to protect base camps and lines of communication.

With regard to quinine prophylaxis, it would be unduly optimistic in face of the experiences in the last war to regard this as a measure which could at any time be relied upon easily to control malaria in an army in the field. If anything was to be achieved in this respect far more attention must be given than at present to preparation and organization. This could be done by ensuring recognition by the higher command of the great importance of this measure, by previous propaganda among officers and men, and by detailed planning as to how the administration was most likely to be facilitated.

Mosquito-proofed huts might again be an important method of control, and the devising of suitable types of hut was worth careful consideration. The mosquito net was the method of prevention effective beyond all others in the hands of the intelligent individual, but the difficulty of utilizing it was great, and insufficient thought had been given to details, especially the means by which the net was to be supported. With electricity and modern facilities there was nothing preposterous in the idea that men might be accommodated in mosquito-proofed huts with electric fans or provided with mosquito nets under conditions in which these could be used. But all this required a good deal of thinking out and experiment before the event.

In conclusion, Sir Rickard Christophers dealt with hospital organization for blood examinations. For this purpose hospitals must have the necessary equipment—not only microscopes, but slides and stains, as well as at least one technician fully familiar with the technique of detection of parasites. He stressed the necessity for planning ahead and for having an effective advisory organization for malaria if there was any probability that large bodies of troops would again be employed in a malarious area.

Malaria in South-Eastern Europe

Dr. C. M. Wenyon said that although malaria undoubtedly figured in earlier wars, what really happened was very vague and indefinite. It was only in the last war that scientific observations were made on the method of spread and attempts at prevention were carried out to any great extent. All his own ideas on war malaria were coloured by his Macedonian experience. It was the occurrence of malaria in Macedonia which stimulated the investigations subsequently through the League of Nations over the whole of South-Eastern Europe. The experience of malaria in the last war had also assisted anti-malarial measures in the Army in India; he was sure that the methods worked out there had been highly successful, and would prove of great service should it be necessary to conduct a war again in a malarious country.

What could be done against malaria in war naturally depended on circumstances. If Gallipoli had been highly malarious it would have been impossible to carry out any considerable anti-malarial measures. Mosquito-proofed huts could not have been provided, and the only conceivable thing that could have been done, where time was of the utmost value and where the troops must not be encumbered with unnecessary material, was some form of chemoprophylaxis. On the other hand, in Macedonia, where the Army was not landed in such great haste, some sort of protection such as mosquito nets was still possible. If the occupation was slower still, as at Taranto, a great deal might be done beforehand in the way of mosquito-proofed huts.

The malarial inquiry laboratory in Macedonia, although sometimes an embarrassment to the D.A.M.S., was of considerable assistance. Such a laboratory had no place in active operations where troops were moved forward, but in static conditions, as in Macedonia, it was able to do much. It was made a rule in Macedonia that streams should be cleared and anti-malarial measures carried out over half a mile around the camps. But although a tremendous amount of clearing of streams was done on a certain plateau just outside Salonika, where there were a number of tented hospitals, the laboratory collected mosquitos regularly in the hospitals; indeed, he doubted whether the transmission rate was really reduced. It was possible that Paris green would have helped to extend anti-larval activities effectively further afield. Quinine prophylaxis seemed to do practically nothing to control the infection, but it definitely controlled the disease. When taking quinine the men did not go sick so often. Quinine, in other words, did not stop the infection, but it prevented the disease from showing itself. Nowadays atebrin might probably be used for therapeutic purposes, and quinine kept for prophylaxis. The mosquito net probably did more to prevent malaria than all the other measures in Macedonia put together. He believed that by the personal use of the net he had himself warded off at least 99 per cent. of possible bites from the anopheles.

Army Anti-malarial Organization

Major-General Marrian Perry (director and professor of pathology, Royal Army Medical College) said that he would be a brave person who hazarded a guess whether troops would be sent to a malarious station during the present war, but it might be interesting to outline briefly the organization for the laboratory diagnosis of malarial infections in the Army. At the base in an infected area there would exist fully equipped laboratories staffed by pathologists, with technicians adequately trained in diagnosis and in the identification of these infections. Further forward in the casualty clearing station area centres for laboratory diagnosis would be provided. There would be mobile laboratories serving a group of stations, and in each of the stations there would be a clinical side-room with all the necessary equipment for malaria diagnosis. In addition, within recent years there had been made available for the more advanced medical units, such as the field ambulance, easily transportable malaria-diagnosis panniers containing all the essential equipment—microscopes, stains, slides, etc. These panniers had already been in use in Palestine and on the North-West Frontier, and had been reported on satisfactorily. Malaria-diagnosis panniers would also be held in reserve at the base hospital laboratories, and could be sent forward with a detachment from those laboratories and begin work at once in any locality. Thus it would be evident that there was a plan for a chain of diagnostic centres from the forward areas to the base, and that mobile diagnostic malaria units would also be provided.

In addition to the regular R.A.M.C. officers who received a full course of laboratory training at the R.A.M. College short-service commissioned officers liable for service abroad received a short intensive course of such training in which malaria diagnosis played a prominent part. The question of training of laboratory technicians had also not been overlooked. A large number of laboratory assistants had been enlisted and formed a pool. These were being trained in malaria diagnosis as well as in other matters. With regard to the supply of drugs other than quinine it had been ascertained that the manufacture of atebrin would be carried out in this country within the next few months. The question of the home manufacture of plasmoquine was rather more difficult but was under careful investigation. No difficulty need be anticipated with regard to stains. The Director-General of the A.M.S. was fully alive to the importance of this whole subject, and the speaker had his authority for stating that he would avail himself of the knowledge and assistance of expert malariologists should the necessity arise.

Recent Experience of Anti-malarial Measures

Colonel J. A. MANIFOLD said that since the last war the Army had been continually dealing with these malaria problems, especially in India, and during the last two years in Palestine under war conditions. Therefore it was not necessary to go back to the experience of 1914–18 so far as the Army was concerned. For fifteen years to his knowledge an excellent organization had existed for the purpose. In India it was not so much to the Army authorities as to the rural councils and municipalities which controlled the civil population that warnings should be addressed. It was the infected civil population on the Army boundary which was the serious factor. It seemed to him that Sir Rickard Christophers had assumed that propaganda among the higher command was necessary, but if he knew the higher command at the present day he would realize that very little propaganda was needed. In the Jordan Valley in Palestine in 1938 the ratio of malaria was 13 per thousand. To one like himself, who had spent some years in a part of Africa where the ratio was some hundreds per thousand, it seemed that anti-malarial measures as organized in Palestine were very efficient. The same was true of Egypt, where the ratio was 3.8 per thousand, although the actual forces employed in Egypt at the time were quite large. The use of mosquito-proofed huts with electric fans had been mentioned. This was an organization which had to be faced at some stage, but until one knew where the Army was actually going and whether shipping and timber would be available, the provision of huts could hardly be demanded. A bivouac tent was tried out last year in Palestine, and he was told that it was very good. He spoke of the great value of the prophylactic dose of quinine, and also stated that anybody taking quinine in a blackwater area was very unlikely to go down with blackwater.

Colonel S. P. JAMES said that in view of the careful work of the Malaria Commission of the League of Nations there were not likely to be the great medical surprises which occurred in the last war even if the present one should extend to operations in malarious country. The question arose whether it would be necessary always to carry out anti-larval operations in war time in the field. It would depend on the locality in which the operations were conducted. In many potential war areas it would be quite impossible to hope that any anti-larval operation could meet with success. In the last war almost nothing was more tragically ridiculous than the immense but quite futile efforts in the way of anti-larval operations in places where success was beyond the power of man. Of course, the difficulty was that sanitarians and others were very loath to discard such measures, but that was an administrative difficulty which in war time might be overcome. He favoured the concentration of measures applicable to the individual soldier and to the barracks, hut, or tent in which he lived rather than on indirect measures in the general environment. The daily systematic use of insecticidal sprays in barracks and outbuildings was recommended by the Malaria Commission and had given excellent results in many countries where it had been employed, and now that very efficient sprays were available he thought this was a measure for which energetic preparation ought to be made. The other two direct measures were mosquito nets and quinine prophylaxis. Every soldier ought to be provided with a mosquito net of a proper pattern and trained in its use with the same care and attention as he was doubtless trained to use his gas mask. As to quinine prophylaxis, there was no doubt about the efficacy of that measure. In war time they ought to forget that quinine did not prevent infection, and to concentrate on the fact that 5 grains of quinine a day would prevent clinical attacks.

Dr. P. MANSON-BAHR mentioned his experience of malaria in Palestine in the last war. No planning could take place beforehand and everything had to be improvised. It fell to his lot at the end of 1917 to train officers and men in the field in the technique of diagnosing malaria. Malaria-diagnosis stations were formed, the great point about them being their extreme mobility. They were mounted on general service wagons and provided with microscopes, stains, and syringes. These followed the cavalry as far as Aleppo, and in two months 40,000 blood slides were examined, and the total number of blood examinations carried out in the last year of the war was 146,000, being practically equal to the whole force in the field. The great danger to troops in the field was the subtertian parasite, the incubation period of which was ten days.

Sir WILLIAM WILLCOX added a few words about his experience of the campaign in Mesopotamia, where he worked with Sir Rickard Christophers. The curious feature was that in the mountainous regions high above sea level a more virulent form of malaria was present than in the swamps down below. He also thought it important to remember in war time that if there was an epidemic of malignant influenza it might be complicated by malaria acting in a symbiotic way.

ORGANIZATION AND TREATMENT OF AIR-RAID CASUALTIES

Dr. J. Trueta of Barcelona at Royal Society of Medicine

A meeting comprising several Sections of the Royal Society of Medicine on October 24 was addressed by Dr. J. Trueta, late director of the department of surgery, General Hospital of Catalunya, Barcelona, on the organization of hospital services for casualties due to the bombing of cities. Mr. T. P. McMurray, president of the Section of Orthopaedics, was in the chair, and the meeting was crowded, 350 being present.

Dr. Trueta said that he was glad to have the opportunity of describing his surgical experiences during the Spanish War in the hope that they might be of use to his British colleagues. The first bombardment of Barcelona was from the sea in November, 1936, when there were 100 casualties among the civil population. Air raids afterwards occurred with increasing frequency, and the hospitals altered their organization as experience demanded. For example, first-aid posts separate from hospitals were abandoned when it was found that they delayed complete treatment and resulted in an increase of mortality.

The Spanish War was the first in which what were described as "total population" tactics were employed. Barcelona and the adjacent towns and villages underwent more than 340 bombardments. The attacks were carried out for two purposes—to bomb military objectives and to terrorize the civil population. The material used in the attack differed according to the purpose in view. Against military objectives the bombs usually employed were heavy ones, weighing more than 600 lb., and the explosions produced great damage. He had seen concrete buildings nine stories in height completely destroyed by such bombs. When they fell in the street they produced cavities from ten to fifteen feet deep, with an enormous dispersion of shell fragments in an upward direction.

Another type of bomb used against buildings was the small incendiary bomb weighing only 2 or 3 lb., several hundreds of which could be carried in an aeroplane. On the buildings of Barcelona, which were chiefly of steel and concrete, the damage done by these bombs was unimportant, and their use was presently abandoned. But against buildings of lighter material, such as those at Guernica, they continued to be used. The light bombs used for terrorizing the civil population were covered with some material like aluminium, and produced thousands of splinters, many of them no larger than a finger-nail. These fragments produced great injury to the tissues, out of all proportion to the apparent damage to the skin.

Casualties in Bombarded Towns and in Front-line Warfare Contrasted

The wounds caused by the heavy bombs were very severe, and only a few cases survived. The transport of such cases was difficult, for shock and haemorrhage were increased with movement. Dispatch to the nearest hospital for complete treatment was the only measure which could save life. Those injured in the collapse of buildings as the result of explosions also needed immediate assistance, and even when such assistance was forthcoming mortality was very high. Cases should be treated in the hospital within two hours of the injury. There was a difference in this respect between casualties in a bombarded town and those occurring in front-line warfare. The latter were due to rifle and machine-gun bullets and to shells, which, if not very near, were not so destructive as aerial bombs. The changing position of the front line in trench warfare required the establishment of hospitals at a sufficient distance behind the lines, out of reach of heavy artillery, and in the front line the collection of casualties was continued systematically. In the open bombarded town, on the other hand, the gravity of the casualties, the proximity of the hospitals, the fact that many victims were injured simultaneously and included women and children, and the absence of rigid discipline made a different organization necessary.

The methods of dealing with the injured in a bombarded town had more in common with those used in towns besieged by armies than with those employed in front-line fighting, though many surgeons who had experience of a besieged town would say that there was always in such conditions the possibility of transporting the victims to safe hospitals, whereas in a city subject to air attack there was no safe place at all. This, however, was only relatively true, as experience in Barcelona had shown. In the city itself there were five hospitals, not one of which was ever hit in the bombardments, but hospitals in the surrounding country, outside the defended area, were bombed several times and put out of action. In one raid alone, when such a hospital suffered, eighty-three were killed and 118 wounded. The reason for this difference was that when attacking planes were flying over defended territory they had to fly at great altitudes, with consequent lack of precision. For example, the electric power station in Barcelona was repeatedly attacked but only once slightly damaged, whereas a factory in a village forty miles away was attacked four times and entirely destroyed.

Getting Casualties to Hospital

Dr. Trueta strongly urged that first-aid posts should be located in the hospitals of the towns subject to bombardment. More than 30 per cent. of the patients needed operation, and whatever facilitated rapid admission to hospital contributed to the more favourable outcome of the treatment. He gave a picture of the pressure on the casualty service during a three days' bombardment of Barcelona in March, 1938, when sixty doctors at the hospital worked almost uninterruptedly for the whole seventy-two hours, and the surgical units were completely exhausted after carrying out 731 operations.

Speed of transport was the first essential. He operated on one victim who had been transported five miles in eighteen minutes; generally about twenty or thirty minutes were taken to cover such a distance. The immediate intervention of the surgeon at the hospital was the only useful form of first aid other than the application of the tourniquet to a limb if there was excessive bleeding. The application of splints, bandages, and other forms of first aid at isolated posts was not only useless but actually dangerous, because it delayed surgical treatment. Such first-aid posts as were organized in Barcelona during the early days of the war were useful only for the treatment of slightly wounded cases and for reassuring the nervous, and the first-aid post in the hospital itself could equally be used for the treatment of the slightly wounded, but only after they had passed through the classification room.

A perfect circulation of ambulances was necessary. A great difference of efficiency was noticed as between two hospitals in Barcelona, one of which had made no provision for the circulation of ambulances, so that much confusion and delay ensued, while the other, having large gardens in its vicinity, was able to impose a system of one-way traffic.

A crucial point was perfect co-operation between the services, especially between the centre for the classification of the wounded and the various operating theatres and wards of the hospital. The casualties should be classified into five groups:

1. People who required immediate operation and whom it was impossible to send out of hospital immediately after treatment.
2. Those who required immediate operation and could be evacuated afterwards.
3. Those who needed immediate treatment and rest without operation and could not be evacuated.
4. Those who after receiving first-aid could be transferred to the base hospital for future treatment.
5. Those who could go home after first-aid treatment.

In the classification room an appropriately coloured card should be attached to each injured person. The director of the classification unit should know the number of surgeons and operating tables available and the specialty of each surgeon, so that the cases might be distributed according to capacity and with some regard to the pressure on each operator. In the surgical units in Barcelona general practitioners and specialists were included, the specialists including an ophthalmologist on account of the frequency of eye injuries. A twenty-four-hour service was established with six units, each made up of eight doctors. Each of the units in turn remained in hospital for twenty-four hours consecutively, and the others were at call.

Clinical Features of Air-raid Injuries

The clinical features of the injuries (Dr. Trueta continued) varied according to the nature of the bombardment, though it was very common to have different types of bombs used in the same raid, and in most raids casualties were also produced by falling masonry. In undefended areas people were frequently wounded by bullets fired from low-flying planes. Generally speaking, those wounded in the streets were less seriously injured than those in fallen buildings. In many raids there were people so gravely wounded with multiple fractures, internal haemorrhage, and gross injuries of chest and abdominal viscera that no surgical treatment was of any help. A feature common to all the injured, especially those injured by fallen buildings, was a marked fall of blood pressure, with a waxy pallor of the skin: they were in a state of mental excitement, but mental depression was rare except in those so gravely wounded that all treatment was hopeless. It was very impressive to see a great collection of wounded directly after an air attack. They were extremely quiet, and there was little crying or moaning in spite of grave wounds, in marked contrast to the excitement and noise of their uninjured friends and relatives.

The types of injuries produced by the bombs could be classed into those produced by heavy bombs and those by light ones. Wounds produced by big shells coming from heavy bombs which fell in the streets but which were aimed against buildings were very destructive, having the character of wounds produced by artillery fire. The following table represented an attempted grouping of wounds; many of these

patients, of course, had minor injuries in other parts of the body:

Multiple major injuries	32.6 per cent.
Lower limbs (including hips)	22.3 „ „
Upper limbs (including shoulders) ..	14.7 „ „
Thorax	12.1 „ „
Abdomen	9.1 „ „
Head (skull and face)	8.2 „ „

In speaking of surgical technique, Dr, Trueta said that he had several times seen infective complications due to insufficient operative exposure. Many of the patients wounded in the abdomen by heavy bombs entered the hospital with great lacerations which made impossible all attempts at intestinal reconstruction. He could recall only two such cases which survived. In the thorax the heavy bomb injuries caused open chest wounds, which were always extremely grave owing to haemorrhage and shock. It was necessary in many cases to practise pneumonectomy. When the first danger was over it was common to see infective complications in the pleura and pleural adhesions, and in several cases he had seen paraplegia following fracture of the spinal column associated with chest injuries. Patients severely wounded in the head by these large bombs rarely arrived alive at hospital, but he had had cases in which the only surgical treatment called for was excision of the edges of the wound, removal of the damaged tissue, and aseptic dressing. Meningo-encephalitis was the most frequent cause of death after these head injuries.

Injuries by Small Bomb Splinters

The small bombs used on Barcelona to terrorize the civil population gave wounds whose appearance differed completely from those inflicted by the heavy bombs. The bombs had great expansive power. A large number of little splinters from them entered the skin—especially the skin of the legs, because the splinters had a horizontal projection—and the skin lesion was painless and without haemorrhage, so that the fact of injury was overlooked in many cases. There was great disproportion between the size of the splinter and the damage done to fascia and muscle; this was to be attributed to the spin which the splinter possessed. Severe comminuted fractures were frequently seen, with great displacements, caused by a very small splinter. It was necessary to operate on all fractures produced by these small splinters, notwithstanding that the minor importance of the skin lesion might lead one to treat them as if they were closed. That mistake had led to several deaths from septicaemia, and especially gas gangrene.

Wounds of the abdomen were generally penetrating and laparotomy was necessary. Rupture of the liver as the result of a small splinter injury was not uncommon, nor was injury of the spleen, which made removal necessary. In the chest these splinters produced very small penetrating wounds, frequently causing severe haemorrhage. It was only the cases with such haemorrhage which needed immediate operation. Generally immobilization of the chest, with rest and morphine, was sufficient, though later operation might be necessary on account of some complication. In the brain the splinter might lie deeply, and owing to the fact that many civilians lay on the floor during an air raid splinters were frequently localized in the base of the skull.

As for casualties produced by falling masonry, the injuries in this group were of all kinds, but there were some common characteristics. The patients generally arrived at hospital covered with dust, making them unrecognizable; they were in a state of shock usually combined with some concussion, and they expressed their feelings with clearness but with indifference. Many of them had numerous injuries, fractures, haemorrhage, rupture of the liver, kidney, or spleen, and showed general collapse. It was not often possible to operate on these casualties immediately because surgical intervention increased the shock, but fortunately in many cases, when shock diminished with appropriate treatment, it was possible to perform an operation.

Classification of Cases

Following upon an air raid, all the injured people arrived at hospital within a very short time and classification was the first procedure. It was possible to send many casualties to base hospitals, but a rigid classification could not be made, for the patient was more important than the lesion, and similar lesions resulted in cases of very different degrees of gravity. Generally speaking, injuries which needed immediate operation included cases in which there was severe haemorrhage, open chest wounds, and injuries involving great destruction and laceration. Other injuries which in most cases needed immediate operation were major wounds of the head, combined fractures, and penetrating wounds in the joints. Injuries which could be sent to the base hospital without operation included penetrating wounds of the skull caused by small splinter bombs, many combined fractures from small splinters, and injuries from falling masonry. Casualties which must remain in the clearing station without operation included those with great shock and those with closed penetrating wounds in the chest. With these criteria it was possible to make a careful selection, but a classification must be made from clinical data in each case. He added that operations should be carried out only on those cases which it was possible to save. Instead of losing time over hopeless cases all energies should be concentrated on those with a better chance of recovery.

Questions and Discussion

In reply to a questioner who asked his opinion of the mobile first-aid units, several of which had been commissioned in one London borough, Dr. Trueta said that in Barcelona during the first year of the civil war an organization of that kind was arranged, with five mobile units, but later they were abandoned and every kind of transport was commandeered for taking all patients direct to hospital. The hospitals in every district carried out first aid, classification, operative work, and evacuation to base. In reply to another question he said that an abundant supply of plaster-of-Paris was ensured in Barcelona, gypsum being a Catalonian product.

Professor J. Duncan White inquired what proportion of the surgically injured required immediate *x*-ray examination before surgical intervention. It was a frequent instruction that every case in which bone injury was suspected should be *x*-rayed, but this would mean a tremendous organization in air-raid casualty work. Dr. Trueta replied that in Barcelona after every important bombardment it was impossible, with very few exceptions, to *x*-ray cases before treating them.

Professor G. R. Girdlestone said that in a previous conversation with Dr. Trueta he had gathered in rather more detail than Dr. Trueta had had opportunity to give on that occasion what happened when the patients got to hospital. They were all taken into one biggish room staffed by second-grade—that is, less experienced—medical personnel. Here a preliminary classification was made, and the casualties were drafted rapidly to the first-aid post, which was also in the hospital. The work at the first-aid post came after the large preliminary examination. Other cases went on to a second classification room, where the patients were completely undressed and inspected by medical personnel of great experience. Here the cases were graded in order of priority—those which needed immediate operation, those which could be sent to the base hospital without operation, and those which must remain without operation at the clearing station—according to the scheme which Dr. Trueta had described; but it was necessary, as he had said, to bear in mind that the individual patient was more important than any standard classification. It was the surgeons who decided what must be done, and the classifying surgeon directed the patients to the different surgical teams, not only in accordance with priority and need for operation, but also having in view which surgeons would be best able to deal with the particular type of injury. This second classification required judgment of a very high order, and as a result of it the patients were drafted to the theatre, the resuscitation room, or the wards, as the case might be.

Mr. Rowley Bristow, in moving a vote of thanks, said that it looked as if a very careful reconsideration of some of the arrangements in this country might well be made following on the lines of the address which Dr. Trueta had given, and the sooner his address was published, read, and digested the better for those who controlled their destinies and the destinies of their hospitals.

Local News

ENGLAND AND WALES

Mental Health of Children

The Child Guidance Council reports that of forty-three recognized child guidance clinics in England and Wales, twenty-five are still open. This number represents all clinics except those in London and Southampton, and they as usual undertake the treatment of nervous, difficult, delinquent, and retarded children. Some of these clinics are situated in receiving areas, and so are available for the treatment of the more seriously disturbed evacuees. Addresses of these clinics and particulars of sessions, etc., may be obtained from the Council's new offices at 23, Queen Square, Bath (telephone: Bath 2390). It is hoped that some of the London clinics may reopen shortly. The Tavistock Clinic Children's Department has been removed to Westfield College, Kidderpore Avenue, N.W.3, and is open, but unable at present to receive non-paying patients. The West End Hospital for Nervous Diseases children's department is closed, but juvenile cases can be seen in the general psychotherapy department. It is hoped that the clinics attached to St. Thomas's Hospital and the Queen's Hospital may reopen shortly. Urgent cases can be seen at the child guidance unit at Great Ormond Street Hospital for Sick Children. The Maudsley Hospital is closed and removed to Mill Hill Emergency Hospital, but work for children is being carried out at the following London County Council "North" London Clinics: St. Mary's Hospital, Highgate; St. Charles's Hospital, Ladbroke Grove; Mile End Hospital, Bancroft Road, E.1. Cases can be seen at these hospitals by appointment only.

Arrangements under Cancer Act

The Minister of Health, in a circular (No. 1884) to county and county borough councils, states that he has decided to extend until March 31, 1941, the period in which they have to submit their arrangements under the Cancer Act, 1939, for his approval. The Act provides that the arrangements must be submitted within one year from its commencement—that is, by March 29, 1940—or such longer period as the Minister may in any case allow. The Minister states that he realizes that by reason of the heavy pressure of extra work in recent months it has not been possible for local authorities generally to give such attention to the matter as would enable them to submit their arrangements within the statutory period, and he has therefore granted a general extension of just over twelve months.

The National Central Library in Time of War

In times of peace the British Isles has, in addition to a splendid public library service, a system of library co-operation (in which the British Medical Association takes part) whereby all persons requiring books for any serious purpose are able to obtain them through their local public, university, or other library. The country is divided into a series of regional library systems, each system covering a group of neighbouring counties, and each having a regional bureau at which a union catalogue of the non-fiction books in nearly all the libraries in the area has been, or is being, compiled. The keystone of the national system is the National Central Library, which, in addition to being itself a great lending library, is the national centre for the inter-lending of books between one library and another. The system has become so efficient that practically any kind of serious literature can now be obtained on loan. The service is available to every branch of the community, from persons requiring information on the humblest everyday matters to research workers needing highly specialized and technical literature. In time of war the national library service will not only continue to be of the utmost importance to those who need books for general purposes, but it will also be of greatly increased value to Government Departments, organizations, and persons needing special literature in connexion with work of national importance. The National Central Library will naturally give priority to the latter service, as it is recognized that in tracing material for persons doing research on all forms of armaments, chemicals, foodstuffs, medicine, and so on, the Library will be filling a gap the existence of which was so serious a drawback during the last war. The organization of the National Central Library, with its great union catalogues and other unique bibliographical material, and the access it has to over twenty-one million books in other libraries in the British Isles, places it in an exceptional position to give service in time of war. Owing to the risk of the destruction of property at the headquarters of the National Central Library in London, all the union catalogues, as well as all other irreplaceable or scarce bibliographical material, have been removed to Bourne Lodge, Bourne End, Hemel Hempstead, Herts. The non-bibliographical books are remaining at the London headquarters in Malet Place, W.C.1.

Correspondence

Doctor and Patient in War Time

Sir,—As a surgeon my only reason for taking part in this correspondence is that the neuroses in war time are less likely to be solely the concern of the physician than they often are in times of peace. The war casualty is in fact more likely to have wounds of the spirit in addition to those of the flesh than is his peace-time counterpart. Should war actually involve the civilian population of this country then this combination of injuries will certainly increase rapidly. Already war neuroses can be detected in patients attending surgical (and other) out-patient departments. Some of the arguments put forward by Dr. Geoffrey Evans in his letter in the *Journal* of October 7 (p. 742) strike me as being so fallacious as to call for comment, and also by implication to imperil the fundamental relationship between patient and doctor. Under war conditions a free choice of doctor is no longer possible, either in the Emergency Medical Service or in the Services, and this fact is an additional argument for maintaining an important relationship unimpaired.

Dr. Geoffrey Evans says in connexion with the doctor's attitude to his patients that "we must sedulously refuse every thought of fear, regret, resentment, and the like, because these thoughts arouse emotions that have a weakening effect." Is this thorough-going self-purgation possible, biological, or wise? Reason may overcome fear, etc., but I doubt if this complete suppression of emotions can be carried out without our becoming medical automata towards our patients. Slogans have a habit of coming home to roost. On all sides we are told, "Your courage, Your cheerfulness, Your resolution, will bring us victory." This may be true, but it leaves unanswered the question whether the victory is to be of force, of reason, or of the spirit. At the present time I am (with hundreds of my colleagues) haunted by the fear of my inability to pay my rent, rates, taxes, etc.; I am filled with regret at many of the actions of the Ministry of Health; and I burn with resentment at the treatment meted out to some of my friends in the present emergency, treatment which would hardly be justified even under a dictatorship. But I do not as yet feel weakened by the emotions which have been aroused, and as far as I am aware neither my relationship to my patients, nor my patients themselves, nor my surgical ability, has been adversely affected. Whether I can control these emotions for the three years envisaged by the Government remains to be seen.

I cannot believe either that it is necessary or advisable to purge ourselves so thoroughly in order to help war-worn patients. The best that we give our patients is usually given unconsciously, and I doubt if we shall improve matters by a course of auto-suggestion. I know I shall not be a good doctor unless I can keep a credit balance from which to

give the patient the help he needs. And I shall feel far stronger in this respect if I have not attempted to dispose of my emotions by repression.

What is this "good stuff" which Dr. Geoffrey Evans advises us to collect to give our patients? Is it a totalitarian attitude of mind, is it a sort of psychological salesmanship, or is it almost propaganda? The "good stuff" hardly seems to be "the stuff to give the troops," whether military or civil.

What of these colourless questions? No intelligent doctor should allow his feelings strongly to colour his words or questions, but need the questions be as colourless as Dr. Evans implies? Such questions will suggest no real interest, and they will be as featureless and flat as the phrases of a French exercise book. Self-purged medical purists will sterilize the fundamental human relationship between patient and doctor, and the patient at least will not be helped. Reactions may tend to be more exaggerated and more primitive in war, but I cannot believe that our response to these phenomena should be an exaggerated impersonal attitude.

Confidence is the basis of the relationship between patient and doctor, and this alone will enable the patient to express himself freely. This confidence will not be helped by too impersonal an attitude on our part or by the use of language purified of all emotional content. The patient comes to us just because he has a *complaint* and because he knows that up to a point we shall be *sorry* for him. The relationship, being one of real dependence, is one which necessarily holds some emotional content. Unless we have some capacity to be sorry for our patients and to indicate that our interest is not merely academic, we shall certainly not be good individual doctors. Surely in dealing with neuroses the doctor will do best who remains an individual understanding being, and not one who has (or apparently has) purged his being of emotional possibilities.

Certainly we should choose our words wisely and weigh them carefully. But it is not necessary to go to the realms of colourlessness to avoid distressing our patients, and by so doing we may embarrass them.—I am, etc.,

St. Mary's Hospital, London, W.2, Oct. 12. REGINALD T. PAYNE.

Psychiatric Casualties of War

SIR,—I read with interest Dr. George Pegge's article on psychiatric casualties of the first days of war (*Journal*, October 14, p. 764). I cannot, however, entirely agree with his conclusion that "cases in which neurosis was established before the outbreak of war are, so far, in many instances, quite unaffected by war strain."

Among my out-patients at the Tower House Psychotherapeutic Clinic, Leicester, the effect of the stress during the first days of war seemed to divide them into three categories.

1. Those who, like Dr. Pegge's cases, were not appreciably affected by the war. These, however, were in the minority, and were the more chronic neurotics who were not responding well to treatment or who showed mild psychotic features. Delinquency and child-guidance cases also were unaffected.

2. Those who improved considerably and unexpectedly. The extra calls upon them seemed to inspire a new purpose in living. They became busy in "blacking-out," etc., and have taken on some voluntary work of national importance, and in fresh activity have become free from symptoms. It is, of course, too soon to say whether they will be able to keep well.

3. Those whose treatment was progressing satisfactorily but have shown a marked relapse which, apart from the outbreak of war, would have been unlikely. These were mainly anxiety states. Some have shown an acute anxiety reaction, with exaggerated fears of danger. They are quite unamenable to reassurances, and patriotic posters such as "Your Courage, Your Cheerfulness, Your Resolution . . .," etc., are almost sufficient to precipitate an anxiety attack whenever seen. These are just the qualities they have lost. Their treatment has been so far by no means easy. In fact their superficial war anxieties seem to form a definite bar, or defence reaction, against the deeper psychotherapeutic treatment which previously was satisfactory. In others there has been an extreme irritability with an aggressive reaction towards their relatives. These are responding well and are able to continue the improvement previously being made. There must be many patients of this third group, responding well to various forms of general or specialized psychological treatment, who whenever danger threatens are likely to add to the difficulties of practitioners and first-aid posts.—I am, etc.,

W. H. WHILES, M.R.C.S., L.R.C.P., D.P.M.

Leicester, Oct. 18.

Chemical Warfare and the Doctor

SIR,—In his valuable article on this subject in your issue of October 14 (p. 778) Colonel E. M. Cowell advises the head-down tilt in cases of pulmonary oedema after phosgene gas. Also he says, "Treat all such lung casualties as stretcher cases, and after admission keep them quiet in bed." Both these recommendations can be carried out by a cheap and simple tilting bed which I have recently introduced (made by Siddall and Hilton, Sowerby Bridge, Yorkshire). For this bed can be tilted and clamped at any angle—head-up or head-down—and I am told it should be useful for draining gas casualties, besides its many other medical and surgical uses.[1]

Colonel Cowell proceeds: "For both HCN and H_2S prolonged artificial respiration with administration of O_2 and CO_2 is indicated. In these cases some form of artificial respiration by apparatus, such as an 'iron lung.' Eve-Riley rocking stretcher, or the Tor tilter, may save life." May I add that the above tilting bed is also able to produce artificial respiration by my 1932 rocking method (a dozen rocks a minute). A rockable bed has the advantages of warmth and comfort for hospital cases, and it can also be used as a flat hospital bed.

Colonel Cowell also—for phosgene cases—advises that nurses should be instructed how to give oxygen (average 5 litres per minute) with tents or masks. This year I have designed for nurses a simple "ward flowmeter" with a large bobbin weighted by a chain. This cannot be knocked over, and the nurse can read it from the other side of the ward. It is strongly made by Coxeter and Son, Morden Road Factory, London, S.W.19.

Here, then, are three more ways in which these gas cases may be helped.—I am, etc.,

Hull, Oct. 14. FRANK C. EVE, M.D., F.R.C.P.

Eye Ointment for Gas Poisoning

SIR,—In view of the possibility of the Germans using gas it is necessary that every R.A.M.C. officer should know what to do with regard to eye burns. During the last war the great majority of such cases were not treated until the soldiers had got beyond the casualty clearing stations. Mere lavage is not sufficient. Lavage with an alkaline lotion such as sodium bicarbonate 5 grains to the ounce, or indeed simple saline, helps to clear the conjunctival sac, but may I suggest that the following ointment be at once instilled for the first twenty-four hours:

Tube A. ℞ Sod. bicarb. .. .. .. 3 per cent.
Aqua dest. } āā 10 per cent.
Adip. lan. anhydr. }
Paraffin molle alb. .. ad 100 per cent.
Ft. ung. Tube.
Sig. Alkaline eye salve for gas poisoning.
First twenty-four hours.

The second twenty-four hours the following:

Tube B. ℞ Ung. ac. boracis .. .. 10 per cent.
Sig. Ophthalmic ointment. Tube.
Second twenty-four hours.

Indeed, Tube B can be continued indefinitely. These tubes are made up by Messrs. Allen and Hanburys according to my instructions.

The patient pulls the lower lid down, lays a worm-like piece of the ointment along the lower fornix, then looks down and closes his eye. Thus the upper lid imprisons the ointment.

[1] *Lancet*, March 11, 1939.

This method is much simpler than the use of a glass rod, and the ointment is not squeezed out between the lids. The eyes should be kept bandaged.

I give this prescription to all soldiers and officers wherever possible, and I would strongly recommend all medical men to do the same.—I am, etc.,

London, W.1, Oct. 19. R. Lindsay Rea.

Work of the L.C.C.

Sir,—I should like to thank you for the references you made in your issue of October 14 (p. 775) to the work of our retiring and much esteemed medical officer of health, Sir Frederick Menzies. Anyone who listened to the debate in the London County Council on October 17 must have realized that everything which you said about his work for London was fully confirmed by those who have been in the closest contact with him.

I must, however, draw attention to certain words—not about Sir Frederick—in your article which I am sure will give rise to a false impression. You refer to "the virtual disappearance for the duration of the war of the L.C.C. public health department and the hospital services as a unit organization." Surely a public health department is just as important, if not more so, in time of war as in that of peace. It would be a sad commentary on our much-vaunted public health work if, at a time when the life of the community is at stake, we relaxed our efforts, in the smallest degree, to preserve the health of every man, woman, and child. With regard to the hospital service, it is true that the Minister of Health directs what use shall be made of hospitals, but the Minister has placed upon the Council the responsibility for the administration and management of all the L.C.C. hospitals (Circular 1874). Further, one has only to mention the Council's responsibility for the civilian sick, the maternity service, the treatment of venereal diseases and tuberculosis, and for general public health to realize the extent of the work still being done at County Hall.

The impression, therefore, that the public health department has virtually disappeared is inaccurate.—I am, etc.,

Somerville Hastings.
Chairman of the Hospitals and Medical Services Committee.

The County Hall, London, S.E.1,
Oct. 17.

Hospital Posts and the E.M.S.

Sir,—Professor L. J. Witts's letter in your issue of October 21 (p. 825) illustrates the widespread confusion which exists as to the intentions of the Ministry of Health regarding the junior officers of the Emergency Medical Service. His statement that "most of our hospital appointments have been indefinitely prolonged by the outbreak of war" is presumably based on the "contacts" guaranteeing a minimum of one year's service which were sent on August 31 to housemen then holding appointments at many of the London and provincial hospitals. Although no official statement to this effect has been made, I understand that these "contracts" (which are not, in fact, legally binding documents) were sent out in error, the original intention having been to offer only three months' guaranteed service. Since then the Ministry has made two attempts to amend its mistake. The first, an invitation on the part of Group Officers to the housemen concerned to resign their "contracts" on the date on which their original appointment would have terminated, has apparently been applied to only a few of the London sectors. The second, a clumsy attempt to cancel the "contracts" altogether, was repudiated semi-officially almost as soon as it was made. No further official announcement has been made, but it appears likely that the Ministry does not intend to allow present housemen to hold their appointments beyond the original term and that from then onwards appointments will be made for three or six months only, at a salary of £200 per annum plus maintenance. Since it is also likely that candidates for the Services will not be accepted unless they have held a hospital appointment, Professor Witts's ideal of compulsory hospital appointments seems likely to obtain some degree of realization.

There is, however, another aspect of the organization which seems to have received less attention than it deserves. In normal circumstances a selected minority of housemen, at the end of their term of office, go on to obtain higher qualifications and to take up more responsible hospital appointments as registrars, R.S.O.s, R.M.O.s, etc., in order to fit themselves for more specialized work as surgeons, consultants, and so on. Of such appointments Professor Witts's complaint that "the normal turnover . . . has ceased" is true, for their holders at the outbreak of war have almost all received long-term contracts which the Ministry of Health does not appear to wish to repudiate. It seems to be assumed that all present and future housemen, for the duration of the war, will join the Services the moment their house appointments are ended. This is particularly hard on some of the present housemen who, after a thorough peace-time training, have been working for perhaps two years or more since qualification with a view to taking the F.R.C.S. or the M.R.C.P. or some other advanced degree in the next few months, and obtaining the additional experience which a more responsible or more specialized hospital appointment can afford. They are now faced, at the end of their present appointment, with the alternatives of remaining unemployed while they attempt to get the higher qualifications without additional experience or of immediately joining the Services, where their opportunities for completing their post-graduate training will be, to say the least, limited. If the demand for newly qualified medical personnel by the Services develops as expected, their war-time successors will have no choice.

But surely there will also be a demand by the Services for more experienced men—for surgical and medical specialists of all sorts—which will have to be satisfied. There may be a few of the present junior officers in the Services who will be lucky enough to get the chance to fit themselves during the next few months to fill such posts. But the difficulties and varied requirements of military medical organization are such that not only will there be no assurance that these officers are the most suitable for such training but also that the demand will exceed the supply from this source and will have to be satisfied, in part at least, at the expense of the civilian medical services. These services themselves, as they expand owing to the increasing influx of civilian and, perhaps, military casualties, are likely to need more specialists for their own purposes, quite apart from the gaps made by military demands, deaths, and retirements. There will thus be an urgent need for men with more experience and qualification than can be got in thirty months' clinical study and six months' house appointment.

Under the emergency organization of the E.M.S., set up so hurriedly at the beginning of September, some of the more senior housemen are already, in fact if not in name, doing the work of registrars and chief assistants, while senior students are doing the work of housemen. It should therefore be possible to find room in the E.M.S. for an intermediate grade of medical officer, to which the more promising housemen can be promoted at the end of their six-months appointment, so as to give them more responsible work, still under some supervision, and the opportunity for higher study and qualification before they go to the Services or, if needed, to higher posts in the E.M.S. This need not reduce the number of house appointments available for the newly qualified, and it will help to ensure that the standard of British medicine is not lowered for the future by a failure to give young talent the opportunity to fulfil its promise.

For personal reasons which will be readily understood I subscribe myself

London, Oct. 22. Houseman.

Medical Education in War

Sir,—The question of medical education in its relation to the Emergency Medical Service is being discussed in the medical journals by teachers, students, and editors, and, in the case of the last, reference has on more than one occasion been made to the "twelve teaching hospitals" in London.

It is natural that the thirteenth school should be a little jealous of its position, and I hope that such references will not lead your readers to infer that the West London Hospital Medical School has ceased to exist. On the contrary, it is, I believe, the only medical school in London where all the students are still working in their own hospital. Twenty-two women and six men are still following a curriculum which is as complete as it can be in view of the scattering of the teaching staff in Sector VII of the E.M.S. and the reservation of many beds for air-raid casualties. The general and special branches of medicine and surgery (including public health and obstetrics) are all still being taught, and the reduction of clinical material is to some extent offset by the more rapid turnover resulting from the early evacuation of cases.

Our most serious problem is pathology. Our pathologists and technicians have left us, and we have had to make temporary arrangements elsewhere for the teaching of this subject to the new students who have entered this term. Other schools, I hear, are making efforts to improvise pathological teaching in hopelessly unsuitable premises. Under such conditions practical work in the ordinary sense will be impossible and its omission will be a serious loss to the curriculum. At the West London we are hoping that it may be possible to resume teaching in our own well-equipped laboratories and class-rooms in the New Year. But this cannot be done without the help of both the pathologists and the technicians who have been called up in the Emergency Medical Service.

The organization of the E.M.S. appears to have been conceived and executed without any thought for the needs of medical education. This may have been unavoidable, as those responsible were doubtless advised that nothing would be left of London but smoking ruins after a few weeks of war. It is no use criticizing the authorities for what has happened in the past, however much each one of us may feel that he could have done it better himself. But for the future it is very much to be hoped that the Minister of Health will realize the urgency of continuing medical education with as little lowering of the usual standards as possible. To ensure this it will be necessary to make available the pathological teachers and technicians who are at present working in the sectors under conditions which make teaching difficult, if not impossible. Unless and until air hostilities prevent it, it would surely be wise, wherever possible, for pathological teaching to be carried out in the usual class-rooms, rather than in the badly equipped accommodation, such as can only be provided by the public assistance and other hospitals which are now being used for potential casualties.—I am, etc.,

MAURICE SHAW,
Dean,
West London Hospital Medical School.

Oct. 23.

SIR,—May we draw the attention of your readers to a matter which we feel must be of great concern to members of the medical profession, and which is of immediate importance to us as medical students?

The Emergency Medical Scheme came into force six weeks ago, and since then there has been a widespread dislocation in the teaching arrangements of all the London medical schools; at the time of writing there is no indication of when teaching will be resumed. Under the present system, students in their clinical years are distributed among the casualty clearing stations in their respective sectors, where they are attached to blood transfusion and surgical teams. In some hospitals the staff have voluntarily instituted teaching, which, while often of a high standard, is not officially recognized. In others there is none, and in few is there adequate clinical material. Under war conditions, when the need for doctors is certain to become greater, we cannot view this lack of organized teaching with anything but dismay, and we are earnestly hoping that some plan for organized medical education will very soon appear. Anticipating such a plan, we venture to suggest the following proposals:

1. *Pre-clinical Training.*—All efforts should be made to ensure that the numbers of students entering on training should not be reduced.

2. *Teaching.*—That the standard of education should suffer as little as possible. Teaching centres should be set up throughout each sector to be attended by all students in neighbouring casualty clearing stations, and vital clinical appointments should be ensured by rotation of students to hospitals where there is appropriate clinical material. While each student should have his emergency station in the E.M.S., the short periods during which his education is interrupted should not count as part of his course.

3. *Economic Conditions.*—Steps should be taken to see that students should not be compelled to give up their careers because of economic hardships imposed by war conditions. Hardship committees to deal with such cases might be set up, including responsible student representatives with first-hand knowledge of students' difficulties.

4. *Examinations.*—The standard of examinations should not be lowered. If it is temporarily necessary to qualify men in a shorter time than normal, this should be achieved by a shorter and more intense period of training, rather than by merely curtailing the present clinical course and making the examination easier to pass. We consider that under the present circumstances the organization of medical training could be more effectively carried out by some central body, such as the University of London, as opposed to the isolated efforts of individual medical schools. In this case the resources of all the London and surrounding hospitals could be pooled and made available for all.

While we fully appreciate the magnitude of the task of reorganizing medical teaching, and the great efforts that are being made by those responsible for it, it is in the interest of both the general public and the medical profession that this should be accomplished as rapidly as possible. We hope that the few suggestions we have made will be of assistance in meeting this urgent situation.—We are, etc.,

A Group of London Medical Students.

28, Great Percy Street, W.C.1, October 16.

X-ray Examination of Militiamen

SIR,—With reference to the correspondence about the *x*-ray examination of militiamen, the best and cheapest method is, I consider, the one introduced in the U.S.A. by Powers *X*-ray Products Inc., which I had the opportunity of seeing over there. This is well-established and recognized by tuberculosis officers and leading chest physicians in the States.

By this method one *x*-ray machine can take films of up to 1,000 men a day (two to three per minute). The personnel required is one radiologist, two radiographers, and a secretary. The films used are paper films in rolls of fifty or a hundred exposures. A viewing box with direct instead of transmitted light is needed. According to American authorities the cost of examinations is thus reduced by about 50 per cent.

The importance of the *x*-ray examination of all H.M. Forces must be emphasized. First, it would reduce the number of pensions payable by the early detection of cases of tuberculosis; and, secondly, the spread of the infection to healthy people would be avoided.—I am, etc.,

London, N.6, Oct. 9. LEO RAU.

Problems of Evacuation

SIR,—We hear a great deal of the difficulties arising from the evacuation of children, and the time now seems ripe for spreading knowledge of those measures which can be taken to deal with such difficulties, and which are already being so successfully practised in Huntingdonshire.

Here, where some hundreds of children have been billeted, at least seventy have presented serious problems, the chief of these being bed-wetting and unmanageableness. I have seen at first hand the work that is being done for the "Women's Voluntary Service" by an experienced child guidance worker in assisting the children to settle down to their new life and in mitigating the hardships of the foster parents. Much has already been done by reshuffling billets. For instance, foster homes that cannot tolerate bed-wetting

can easily deal with stealing, whilst others who cannot put up with a child unable to use knife and fork do not mind a great noise and mess in the house. But this has been but one part of the child guidance worker's duties. The second has been to establish and run centres for the treatment of those children who are really anxious and psychologically ill. In her car the worker carries around play therapy apparatus from one centre to another. Thirdly, she has organized a hostel for about twenty of the completely "unbilletable" and difficult children, and I have seen them as a happy noisy crowd under the supervision of a thoroughly understanding teacher, nurse, and housekeeper. Some children cease to be problems when placed in the care of more experienced people, whilst others require—and are receiving—individual psychological treatment. The success of the work can be gauged from the fact that among sixteen children sent to the hostel for bed-wetting there are now only two wet beds per night.

It is to be hoped that other areas will follow this example, since individual difficulties of this kind are seriously interfering with the success of evacuation schemes—schemes which have cost the country a great deal of trouble and expense.—I am, etc.,

Southampton, Oct. 19. S. L. Yates.

Sir,—In reference to your admiration for the "successful exodus" and the adverse comments of your correspondents in reference to the L.C.C. and the education authority, I write to point out that criticism should be directed chiefly to the Ministry of Health. My reasons are these:

Last autumn, after a wireless broadcast about the Ministry's scheme for evacuation, I was visited by a volunteer representing the local health authority inquiring about the number of rooms in my house, etc. I told her the scheme as announced on the wireless struck me as excellent for the distribution of vermin throughout the countryside, and asked her what methods the local authority had in view to safeguard the neighbourhood. She replied she had never thought of it, did not think anyone had, and did not believe the danger existed because (she argued) the children would be under the care of teachers and under medical inspection. I told her I could not believe the health services could have so far improved conditions since I retired from practice as to have eliminated the danger, and my experience had taught me that teachers, with their attention concentrated on teaching, very often failed to observe obvious vermin, let alone the eggs of vermin. She promised to report my warning to the local authority.

At the end of July, or early half of August last, I called on the local officer in charge of the scheme. He informed me that my warning had been noted in a book, but he was satisfied there was no danger because the health authority of the evacuating area had had the matter in hand for months. I repeated I thought it a matter to be thought of. When evacuees arrived I was informed many were verminous. One girl volunteer told me she was struck by sores on some children she had to carry and dump on a hostess. This would have been bad enough. But, further, there were women among them who soiled their beds with urine and faeces.

I submit it would have been a simple thing for the Ministry of Health to ascertain from each evacuating area the approximate number of their slum population, and have instructed each corresponding reception area to be prepared to receive that number of people not fit to be billeted in any home. They should have given advice as to how best to tackle the problem instead of leading the local authority to suppose there was no danger because the health authority of the evacuating area had the matter in hand for months. How could small towns and villages be prepared without receiving such information and advice? As a member of the medical profession I am deeply humiliated by the lack of foresight and sympathy displayed by the Ministry of Health, which is the responsible authority in the matter under consideration.—I am, etc.,

Bangor, Oct. 18. Erie Evans.

Intussusception from Meckel's Diverticulum

Sir,—The three notes on intussusception from a Meckel's diverticulum published in the *Journal* of March 10 and 17 and April 21 emphasize the rarity and the interest of this condition. The following describes the treatment of such a case by a two-stage operation for a moribund patient.

A boy aged 1½ years was admitted to hospital cold, almost pulseless, and dehydrated. He presented the classical symptoms and signs of an intussusception with an abdominal tumour and the passage of blood per rectum. After restoratives, the operation was undertaken and the intussusception was confirmed but only reduced partially. The apex was found to be a Meckel's diverticulum which could not be unfolded owing to the gross oedema about it. However, enough of the invagination had been undone to permit the normal passage of the bowel contents; besides which the child's state was so parlous that extension of the operation to excise the protrusion was clearly prohibited. The diverticulum was anchored by a single catgut suture to the lower end of the abdominal incision and the wound was closed. A blood transfusion and intravenous saline were given and the child rallied.

Three weeks later the wound was reopened and the diverticulum was readily delivered. The oedema had subsided, the invagination was still present and still irreducible. It was excised and an uneventful recovery ensued.—I am, etc.,

Oct. 13. Harold Dodd.

Sir,—In your issue of October 7 (p. 722) Mr. R. Stuppel describes an interesting case of irreducible intussusception due to a Meckel's diverticulum, and goes on to discuss the principles of treatment of these cases. He concludes that it is unjustifiable to leave an unreduced intussusception in the abdomen after performing a short circuit, and states that "to excise the tumour . . . cannot materially add to the shock of the operation." This conclusion, I believe, requires some qualification. It has been shown that the mortality rate of resection for irreducible intussusception in infants is very high, and, in fact, approaches 100 per cent.

In my 1935 report (*Lancet*, **2**, 992) of three cases, referred to by Mr. Stuppel, the successful treatment by short-circuiting anastomosis was based on the facts that the cause of death in the majority of untreated cases is intestinal obstruction and that peritonitis due to gangrene of the intussusceptum is a rare complication, and it was suggested that this treatment gave the best chance of survival. Although, of course, the risk of peritonitis cannot be altogether excluded, this risk is much less than that of resection in children under 3 years of age. As older children are better able than infants to withstand major abdominal operations, the slight risk of peritonitis when the intussusception is left *in situ* is, perhaps, an argument in favour of resection in their case, but it is justifiable to take this risk when dealing with very young children in view of the high mortality following resection. The contention that an intestinal resection following an anastomosis does not materially add to the shock of the operation cannot be accepted.

By a coincidence, I have during this past week operated on an irreducible intussusception in a child of 2½ years; a short circuit without resection was performed, and up to the present time the progress has been satisfactory.—I am, etc.,

Reading, Oct. 16. A. Elliot Smith.

Sir,—I wish to report another case of acute intussusception caused by a Meckel's diverticulum following that of Mr. R. Stuppel's in your issue of October 7 (p. 722). Although the condition is apparently not uncommon, it is insufficiently reported, especially in view of its high mortality and the varied opinion as to its treatment. This case is similar to Mr. Stuppel's and gives a further method of treatment where a primary resection is inadvisable.

In October, 1938, a girl aged 4 was admitted as an "emergency" with an abdominal tumour. She had been ill with some abdominal pain for four days and acute pain associated with vomiting for twenty-four hours, which had ceased for the last few hours. There

had never been any previous attacks so far as could be made out. There had been no passage of blood or mucus per rectum, and the bowels had been open the day before.

On examination she was a very pale, dehydrated child in no obvious pain. Temperature was 98° F. and her pulse rate 120. There was very little abdominal distension apart from an obvious tumour in the umbilical region about 2½ by 4 inches and freely mobile. It did not readily suggest an intussusception from its shape, but this was considered to be the likely diagnosis. There was nothing to be felt per rectum.

Operation was performed under gas-and-oxygen anaesthesia. Subumbilical incision was made and the tumour delivered. It consisted of the last part of the ileum and was confined to it. In spite of trying various methods it could not be reduced, and there was great risk of splitting the ensheathing layer, which was congested and rather distended with its contents but otherwise healthy. A side-to-side anastomosis was made between the afferent and efferent loops a short distance from the tumour. It was not justifiable to resect the tumour owing to the grave condition of the child, so the abdomen was closed with the tumour outside the abdominal wall, as in a Mikulicz operation. Intravenous saline was given, and the post-operative course never really gave rise to any anxiety. The bowels were open the following day and for the rest of her time in hospital. Four days later the tumour was removed with the diathermy knife under gas and oxygen. Although there was very little leakage from the ileostomy it was sufficient to produce some digestive appearances of the wound margin. A further operation was performed to close the fistula, which was done three weeks after the original operation by a simple suture, the peritoneal cavity not being opened. From then on there was an uninterrupted recovery and there were no ill effects when seen recently.

The specimen removed was similar to the one reported by Mr. Stuppel with an equally long gangrenous, perforated, and invaginated Meckel's diverticulum three inches long. The whole tumour had been twisted on itself, thus losing its sausage shape.

Although it may be possible to resect the intestine, preceded by a preliminary lateral anastomosis as outlined by Mr. Stuppel, there will be some cases in which this is not always considered advisable, as it appeared in the case above. The bitter experiences of Mr. Stuppel's case showed that the returning of the mass to the abdominal cavity is unjustifiable, although Mr. Elliot Smith's cases were successful. Viability of the ensheathing layer gives no indication as to the viability of the entering and returning layers. Also, suturing the layers together or hoping for a spontaneous cure cannot be relied on and does not seem to be devoid of a definite risk.

In view of the high mortality of resection of the intestine in children it would be interesting to hear the views of others who have tried resection by stages.—I am, etc.,

King's Lynn, Oct. 21. JOHN O. HARRISON.

Varicosities of Veins

SIR,—Professor Lambert Rogers (*Journal*, August 19, p. 383) in his paper on the treatment of varicosities of veins stressed the importance of tying the saphenous vein above its highest tributary. In your issue of September 9 (p. 581) Dr. W. D. Park suggests that it is easier and equally effective to ligature the vein above the highest dilated part. Personally, I am in entire agreement with Professor Rogers, and my own experience of combined ligature and injection in 329 cases has convinced me that the method advocated by Dr. Park is at least as difficult, and is followed by a large number of late recurrences.

In 1932, disappointed with the late results of injection only in advanced cases of varicose veins, I began to use the operation which Dr. Park now suggests. In 160 cases I tied the vein just above the highest dilated part and at the same time injected sodium morrhuate distally. The immediate results were excellent, and I agree with Dr. Park that many cases require no more injections or apparently less than if the vein is tied at the saphenous opening. It was only after a year or so that recurrences from this operation began to appear. So far eighteen, or 20 per cent., of these cases have developed gross recurrences; the shortest period before recurrence was six months, the longest about three years.

I do not think there can be any argument that on anatomical and physiological grounds ligature at the saphenous opening is the more radical operation. The operation at the saphenous opening is also, in my opinion, an easier one than the distal ligature because we have a definite fixed surface marking for the saphenous opening, while it is remarkable how often it is difficult to find the lower vein in the leg, even when its position has been carefully marked on the skin beforehand. Many surgeons consider that the proximal ligation of the saphenous vein close to the femoral trunk is fraught with danger. Personally, I consider that this risk has been grossly exaggerated. I have never seen any complications which could be attributed to high ligation in 169 cases, most of which were allowed to go home on the day of the operation, and I know of many colleagues who have had as fortunate an experience.

I have been very conscious of the fact that if sodium morrhuate has been injected after saphenous-femoral ligation the sclerosing effect is very limited. It appeared to me that this difficulty could only be overcome by injecting large doses of the sclerosing fluid and massaging it down the vein or by passing a long needle or catheter down the vein and injecting as it is being withdrawn. Sodium morrhuate, unfortunately, cannot be used in large doses, and, moreover, it is my experience that it produces more perivenitis and a more massive clot than the other sclerosing fluids. For the last five years I have used sodium salicylate in 30 per cent. solution and have found the results to be very satisfactory; it can be used with safety in doses of 10 or more c.cm. and produces the minimum amount of perivenitis and thickening. Unfortunately sodium salicylate produces a severe cramp-like pain in the leg, but this does not last for more than a minute or two.

I find that the best method of spreading the sclerosing fluid over the largest area of the varicosities is to pass a ureteric catheter down the vein as far as it will go and then inject the fluid while the catheter is slowly withdrawn. As the catheter is passed down the vein it will be felt to catch in the valves, but with a little manipulation it will slip on.—I am, etc.,

Liverpool, October 15. J. B. OLDHAM.

Melted Wax in Therapeutics

SIR,—Melted wax has been used for some years for the purpose of applying heat to rheumatic joints. For the last four years some of us at the local hospital and in our practices have extended its use to various inflammatory conditions such as local sepsis, pleurisy, etc. The immediate local treatment of such conditions may be summarized as: first, immobilization to prevent the spread of infection, and, secondly, the application of heat to increase blood supply and mobilize body defences to the site affected. In my opinion melted wax is by far the most efficient way of applying heat that we possess. The inflamed hand or finger which leaves the surgeon uncertain as to when and where to incise will often be induced to localize within twenty-four or forty-eight hours into a large pus blister which can be dealt with without anaesthesia.

In the treatment of inflammation it is not sufficient to apply the wax for an hour at a time. It is best to put it on in layers in the usual way with a brush and incorporate some cotton-wool in the last layer. Such an application need only be changed every twelve hours, and is light and comforting to the patient. Hard paraffin wax can be obtained from the chemist at about 8d. a pound with a melting-point varying from 120° to 140° F. As it can be used repeatedly the cost of each application is almost negligible.—I am, etc.,

Ashford, Kent, Oct. 10. E. SCOTT, M.D.

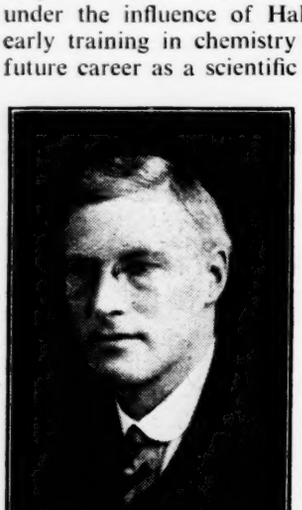
Cisternal or Lumbar Puncture.—Weidner favours lumbar puncture, having had two cases in which death followed cisternal puncture; in one case death was caused by a subarachnoid haemorrhage. After lumbar puncture he injects physiological saline into the spinal canal (four-fifths of the amount of cerebrospinal fluid withdrawn) in order to restore the intraspinal pressure to its previous level and to prevent the headache which commonly follows lumbar puncture.—K. Weidner.—*Klin. Wschr.*, June 30, 1938, **28**, 911.

Obituary

EDWARD PALMER POULTON, D.M., F.R.C.P.

Senior Physician to Guy's Hospital

Edward Palmer Poulton, who died on October 18, was the elder son of Sir Edward Poulton, F.R.S., Hope Professor of Zoology at the University of Oxford from 1893 to 1933. He was born at Oxford in 1883 and was educated at Rugby, where he was a science exhibitioner, and Balliol, where he was a science scholar. He obtained a second class in the final honour school of chemistry in 1905. He stayed two additional years in Oxford before going to Guy's in order to work for his first M.B., and there came under the influence of Haldane. This together with his early training in chemistry had a profound effect on his future career as a scientific physician. In 1911 he gained the Radcliffe Travelling Fellowship, and after finishing his house appointments at Guy's he went to Munich, where he worked under Fr. von Müller, the greatest German physician of the twentieth century. He returned to Guy's in 1912 as demonstrator of physiology, and the next year he was appointed medical registrar. In 1914 he was elected assistant physician and gained a Beit Memorial Research Fellowship. In 1918 he was elected Fellow of the Royal College of Physicians and delivered the Goulstonian Lecture on recent views on diabetes mellitus and on the significance of acidosis in disease. In 1921 he was awarded the Radcliffe Prize by the University of Oxford for original research, and in 1928 he was Oliver Sharpey Lecturer at the Royal College of Physicians. In 1926 he was elected physician to Guy's. In July of this year he became senior physician, and under normal conditions the hospital would have had the benefit of his services in this capacity for four years. But the war led to the dispersal of the staff, and students and Poulton joined the section which went to Pembury, near Tunbridge Wells, where he was taking a leading part in the clinical instruction of the students at the time of his untimely death.



Poulton was interested in many branches of medicine, but he always approached the study of disease from the point of view of a biochemist. Like Pavy sixty years earlier, he made Guy's a centre for research in diabetes, and he made many important contributions to our knowledge of the disease and to its treatment both before and after the discovery of insulin. He believed that the usual method of measuring the basal metabolism rate depended upon false principles, and he made elaborate chemical and mathematical studies with the object of putting the subject on a more accurate and scientific basis. He was an expert in dietetics and wrote a useful book on the dietetic treatment of diabetes and obesity with a large collection of recipes. Poulton's early work with Haldane had made him interested in the chemistry of respiration, and his most valuable contribution to practical medicine was in connexion with oxygen therapy. He was tireless in devising improved methods for its effective administration. He showed how oxygen, when given in sufficient concentration, was of enormous value in many conditions in which hitherto it had never been employed. His oxygen tent came into use in the majority of large hospitals, and he arranged for a service by which an apparatus could be sent with a skilled technician to a hospital or private house anywhere in the country. This work must have saved countless lives, and, though simpler methods of giving oxygen are now generally used instead of the tent, our knowledge of the need for high concentrations and of the many indications for oxygen therapy are largely the result of his unceasing investigations on the subject.

Poulton was a first-class hockey player in his student days, gaining his half-blue for Oxford in 1905 and 1906, but a succession of illnesses restricted his physical activity in later years. However, he never allowed this to interfere with his work at Guy's. He was a better biochemist than clinician, and his enjoyment of teaching did not always receive the appreciation it deserved. He was a regular attendant at meetings of the Royal Society of Medicine, the Association of British Physicians, and the Medical Research Club, and he was one of the few physicians who rarely missed a meeting of the Physiological Society. He received four grants for research from the British Medical Association, and was secretary of the Section of Medicine at Bradford in 1924, vice-president of the Section of Therapeutics at Edinburgh 1927, and vice-president of the Section of Medicine at Eastbourne in 1931.

After the death of Sir Frederick Taylor, Poulton was asked to edit the twelfth edition of his *Practice of Medicine*, and he was also responsible for the three further editions which have appeared since then. The book has deservedly retained its popularity among students, as Poulton put in an enormous amount of work to keep it completely up to date, but whereas in Taylor's time it was still possible for one man to write the whole of a book on medicine by himself Poulton wisely obtained the help of colleagues to look after such special subjects as dermatology and neurology. The dogmatic style of the earlier editions was in remarkable contrast with the character of Taylor's bedside teaching, but the later editions clearly showed Poulton's special interest in biochemistry and his original and often unorthodox views on treatment.

Everybody liked Poulton, and his death comes as a severe blow to the hospital he served so well. At the same time it removes an outstanding personality from the medical life of the country.

In 1911 Poulton married Elfrida, daughter of the late Charles Maclean of Glenearn. He had three sons, the eldest of whom is in his father's profession, and two daughters.

A. F. H.

[The photograph reproduced is by Elliott and Fry, Ltd.]

A. T. PITTS, D.S.O., M.R.C.S., L.D.S.

Our sympathies will be with our colleagues of the dental profession for the loss that they have sustained by the unexpected and early death of Mr. Arthur Thomas Pitts, who had done so much for the British Dental Association during the past years.

The abilities of Mr. Pitts were speedily recognized both by his teachers and his fellow students at the Middlesex Hospital. His was an ability which included not only the power to grasp the accumulated wisdom and experience of medical practice and teaching put before him in the laboratories, the lecture rooms, and in the hospital clinics as becometh a good student, but also the finer

power of giving a clear expression to this knowledge. He could write. So that in his later student days he became the editor of the *Middlesex Hospital Journal*, and an exceptionally good editor he proved himself to be. This early work of his was as it were the signpost to his best and most valuable work for his professional colleagues. Soon after the end of the last war he became the scientific editor of the *British Dental Journal*, and his work in that field proved to be of a high order and of real service. The loss of these services of his will be felt by all members of his profession.

His attainments in the practice of dental surgery were recognized by his appointment as dental surgeon to the Royal Dental Hospital, and also to the Middlesex Hospital; and as examiner in dental surgery to the Royal College of Surgeons of England and to the University of Liverpool. His abilities in general medicine and in executive power were proved by his work in the last war. He served from 1914 to 1919 and reached the rank of lieutenant-colonel in 1917. He was O.C. of the 4th Cavalry Field Ambulance, B.E.F. For his services he was mentioned twice in dispatches and awarded the D.S.O. As a man he was of the gentlest and most kindly nature. He was always willing to help others. And he did these services in such fashion that the recipient of his aid also received the impression that he was conferring a favour upon Pitts by allowing him to give this kindly help. He was truly a gentle man.

N. Bishop Harman.

BEDFORD FENWICK, M.D.

Consulting Gynaecologist, Hospital for Women, Soho

Dr. Bedford Fenwick, who died at Cambridge Gate, Regent's Park, London, on October 14, was a member of a well-known medical family. His father, Samuel Fenwick, M.D., practised at North Shields and in Harley Street.

Born on March 2, 1855, Bedford Fenwick received his medical education at the London Hospital and at Newcastle-upon-Tyne, and graduated M.B. of the University of Durham in 1877, proceeding to the M.D. in 1880 and taking the M.R.C.P.Lond. in 1881. After postgraduate study in Leipzig, Berlin, and Paris, he settled in practice in London and was elected assistant physician to the City of London Hospital for Diseases of the Chest. Specializing later in gynaecology he was for many years a member of the visiting staff of the Hospital for Women, Soho, and Editor of the *British Gynaecological Journal*. Dr. Fenwick married in 1887 Ethel Gordon Manson on her retirement from the post of matron of St. Bartholomew's Hospital. He became trustee and treasurer of the British College of Nurses, one of the many institutions, national and international, founded and presided over by Mrs. Bedford Fenwick, and he took a warm interest in the *British Journal of Nursing* of which she has long been editor. He edited the sixth edition of the *Student's Guide to Medical Diagnosis* in 1886 and wrote several books—*Nursing of Chest Diseases*, 1901; *Common Complaints of Women*, second edition, 1920; and *Uterine Fibroids and Pelvic Tumours*, third edition, 1920.

Mr. Thomas Morrell-Thomas, who died on October 9 at the age of 68, was educated at Aberystwyth College and Guy's Hospital, and graduated M.B., B.S.Lond., with first-class honours, in 1895. He took the M.S. soon afterwards and the M.D. and the F.R.C.S. in 1897. Having served as assistant demonstrator of anatomy and house-surgeon at Guy's Hospital, he joined his uncle, the late Sir Garrod Thomas, in Newport, Monmouthshire, and was elected to the surgical staff of the Royal Gwent Hospital. Mr. Morrell-Thomas combined the work of general practitioner and surgeon, and held many appointments, including those of visiting surgeon to the Monmouthshire and Newport Mental Hospitals, and consulting surgeon to the Welsh National Memorial Hospital, Newport. During the last war he held a commission as major R.A.M.C.(T.) on the *à la suite* staff of the 3rd Western General Hospital. He joined the British Medical Association in 1898, and was a past president of the Newport Medical Society.

Dr. Frank Allan Roberts, who died suddenly on October 9 at Houghton House, Brighouse, Yorks, aged 73, was the elder son of Samuel Drake Roberts of Rawfolds, Cleckheaton, and had his professional training at the Yorkshire College, Leeds. After taking the English Conjoint diplomas in 1891 he served as house-physician and resident medical officer at the General Infirmary at Leeds, and resident medical officer to the Leeds Public Dispensary. In 1894 he graduated M.D.Lond., and some years later settled in practice at Brighouse. For many years he was deputy medical superintendent of the Clifton Hospital, and he had been a member of the British Medical Association for nearly half a century.

We regret to announce the death of Dr. John Joseph Tisdall, which took place at Boughton Hall, Chester, on October 11, in his eightieth year. He studied medicine at Liverpool and Edinburgh, and qualified L.R.C.P., L.R.C.S.Ed. and L.M. in 1882. He joined the British Medical Association in 1896, and always took a keen interest in the affairs of his profession. For many years while in private practice, and later while superintendent of Tue Brook Villa Liverpool, he attended the Annual Representative Meetings; he was a representative of Liverpool in 1903, in 1914-17, in 1919, and in 1921. His son is Dr. Charles J. Tisdall, resident physician at Boughton Hall, Chester.

We have received the following further particulars of the career of Dr. Augustus Mayberry Whitestone, whose death was recorded in last week's *Journal*. He practised at Hollingbourne, Kent, and was medical officer to Hollingbourne Union for thirty-six years, when being knocked down by a motor cycle he was forced to retire. Returning to live among his old friends in 1936, in failing health, he received a warm welcome, owing to his cheery nature and constant kindliness. A friend who helped him with his work in 1924, when he was recovering from pneumonia, writes: "I have the happiest memories of that time, of his sweet nature and how he taught me to run a practice. I admired him and his robust outlook on life and on his work. In my own medical life I have often tried to deal with things in his way. It is in contacts like these that tradition in our profession is handed on, and I am fortunate that I was privileged to meet him in that way." Dr. Whitestone married in 1894 a daughter of the late Major-General Sir Frederic Goldsmid, and has one son, a colonel in the Royal Engineers, now serving at the front.

The death of Mr. Ernest Harding-Freeland took place within a month of his retirement from the post of medical officer of the Isle of Thanet Joint Isolation Hospital at Haine, which he had held for thirteen years. The son of a naval officer, Commander J. O. Freeland, he studied medicine at the Middlesex Hospital, and qualified M.R.C.S., L.R.C.P. in 1885. After holding a number of hospital posts, including those of house-surgeon at the Middlesex, surgical registrar at the Royal National Orthopaedic, and resident medical officer at the Royal Waterloo Hospital for Children and Women, he took the F.R.C.S. in 1897. During the war he served with the temporary rank of captain R.A.M.C., and afterwards practised at Herne Bay before moving to Haine, near Ramsgate. Mr. Harding-Freeland had been a member of the British Medical Association for forty years.

Aspiration Therapy of Tuberculous Cavities.—This is a preliminary communication, with a detailed case report, of a method of treatment that will probably excite much interest.—Aspiration Therapy of Tuberculous Pulmonary Cavities. V. Monaldi.—*Z. Tuberk.* May, 1939, 82, Heft 5, 273.

Medico-Legal

PROCAINE OR PERCAINE?

A doctor desired to administer a local anaesthetic to a patient suffering from arthritis. He went to a firm of chemists and asked one of the dispensers for a drug. About midday the bottle arrived labelled: "Not to be taken. Sterile solution of percaine, 2 per cent. 50 c.cm. Poison." He read the label and opened the bottle, and referred to the manufacturer's catalogue, in which he found listed a 2 per cent. solution of percaine for use "exclusively in surface anaesthesia." He decided that it would serve his purpose, and injected about 12 c.cm. around the patient's shoulder. Within five minutes she said she felt faint; she then went into convulsions and died in about half an hour from heart failure and acute oedema of the lungs.

At the inquest before the Bournemouth coroner, held on October 5, the doctor said he had asked the dispenser for a 2 per cent. solution of procaine. He did not say what he wanted it for, and was not asked to sign the poisons book. He had thought that use for surface anaesthesia did not exclude subcutaneous injection. He produced a list which he had made as a personal memorandum for use that morning: it contained the name "procaine." It was quite usual, he said, to ask verbally for procaine; in a dilution under 10 per cent. it was not a First Schedule poison. (Poisons in the First Schedule to the Poisons Rules must be signed for by the purchaser in the poisons book or entered in the prescription book.) When he had gone to the chemists he had not known there was such a preparation as 2 per cent. percaine, though he had heard of the name. He knew that procaine was a normal local anaesthetic, and that percaine was more commonly used as a spinal anaesthetic, and that if he had asked for percaine he would have had to sign the poisons book. In cross-examination he said he did not know that percaine was at least ten times more toxic than procaine.

The dispenser, in evidence, said that the doctor asked for percaine, and that he himself entered in the day-book a sale of percaine as soon as the doctor left the shop. He did not know at the time that percaine was a First Schedule poison in weaker strength than 10 per cent., or that there was a considerable difference between 2 per cent. percaine and 2 per cent. procaine. A qualified pharmacist employed by the firm said that after the doctor left he and the dispenser discussed the amount of percaine crystals which should be put into the water for the solution. According to the maker's price list a 2 per cent. solution of percaine was a First Schedule poison, but at that time he did not think it was. Another pharmacist said he had also checked the quantity, and had not been fully aware that percaine was in the First Schedule. A medical representative of the manufacturers of percaine said it was a synthetic local anaesthetic with properties like those of cocaine, and might be injected into the tissues, but the 2 per cent. solution was not safe for injection. The proper concentration in this case would have been one-tenth of 1 per cent.; 2 per cent. procaine would have been suitable. The maximum safe dose for this patient would have been about 60 mg. of percaine, but the doctor had given 240 mg. The drug should not have been dispensed without a written order. A pathologist agreed that the drug was a proper one to administer, but the strength had been too great.

The coroner advised the jury that if they were in doubt whether the doctor had been guilty of criminal negligence they must give him the benefit of that doubt. He pointed to the frankness of the doctor's admission of his mistake. It was dangerous to give a verbal order for a drug, and the doctor, when he found that the chemist had sent him percaine, could easily have rung up to say that it was not what he had ordered. The jury returned a verdict of death from misadventure with a degree of negligence on the part of the chemist and the doctor, but not criminal negligence.

The Question of Negligence

The degree of negligence which a jury may regard as criminal has been dealt with very fully by the courts, particularly by the Lord Chief Justice in R. *v.* Bateman (1925). The carelessness has to be quite unusually bad, or aggravated in some unusual way, to amount to criminal negligence, and a verdict of criminal negligence against a doctor is a very rare thing. As the coroner remarked, the death was due to an unusual chain of misfortunes. Perhaps the most important factor was the similarity of the two names. Procaine is a scientific name for a local anaesthetic of low toxicity, and is mentioned in the *British Pharmacopoeia*. Percaine is a proprietary name applied by a well-known firm of drug manufacturers to a synthetic compound with properties similar to those of cocaine, one of the most powerful local anaesthetics obtainable. The evidence suggested that the doctor had not the vital distinction between the two names present to his mind, and the chemists did not realize they were dealing with such a dangerous substance, or indeed that it was a First Schedule poison. They were within the law in dispensing percaine on a doctor's verbal order if they made, as they did, a suitable entry in the prescription book. Procaine, though it may only be sold by a qualified pharmacist, may be sold to a lay purchaser without restriction or record. This accident might have been avoided if the doctor had written a prescription for the drug instead of relying on a request by word of mouth. Verbal prescription is probably harmless in the vast majority of cases, but an appreciable number of accidents can be directly traced to it.

STATUTORY PROTECTION OF MEDICAL OFFICERS

In order to protect public authorities from claims made against them a long time after the facts on which they are based occur, Parliament passed in 1893 the Public Authorities Protection Act. An action against an ordinary citizen may as a general rule be brought at any time within six years, but this Act limits the period for bringing an action against a public authority to six months. It applies to "any action . . . against any person or any act done in pursuance or execution or intended execution of any Act of Parliament or of any public duty or authority, or in respect of any alleged neglect or default in the execution of any such act, duty, or authority." A child was severely burnt during an operation for the removal of tonsils and adenoids at the West Middlesex Hospital; by her mother, suing as her next friend, she claimed damages from the surgeon and the anaesthetist, but did not bring her action within six months. The doctors denied negligence and relied on the protection of the Act. The patient maintained that it did not apply to them. It would, her advisers said, have protected the Middlesex County Council, but they were not responsible for the actions of these doctors. When doctors are employed by a local authority they are not servants carrying out the orders of their employer; they act on their own discretion in accordance with their skill, and are independent contractors. Therefore, said the patient, they cannot claim the protection which the Act gives to the council employing them.

Counsel for the doctors submitted that the Act clearly protects individuals as well as public bodies. Mr. Justice Atkinson, trying the preliminary point of law, remarked (*Times*, October 6, 1939) that it was curious that the precise point seemed never to have been argued before. A servant or agent of a local authority has long been recognized to be entitled to the same protection as the local authority itself, but these doctors were not servants or agents. He pointed, however, to an admission in Freeborn *v.* Leeming (1926) that a medical officer is entitled to the same protection as a public authority; and to Mr. Justice McCardie's remark in Venn *v.* Tedesco (1926) that it was conceded that medical officers were

within the class of individuals covered by the Act. That judge, said his lordship, would never have referred to that admission unless he had thought it was right. In those cases, therefore, the law had been regarded as settled, and he could not now rule differently unless he thought they were wrong. In fact, he thought they were right, and that as the doctors were acting in pursuance of a duty laid on the Council they were entitled to the benefit of the Act.

INSANITY AND CIVIL RESPONSIBILITY

Insanity as a defence to a criminal charge—usually murder—is familiar. By the "MacNaghten rule" a man is responsible for his actions unless by reason of disease of the mind he did not know what he was doing or that what he was doing was wrong. It has recently been held in the Divorce Court[1] that intention is a necessary ingredient of the matrimonial offences of cruelty or desertion, and that if the respondent, by reason of insanity, is incapable of forming the intention to be cruel or of retaining the intention to desert, the petition on those grounds must fail.

The degree of insanity which will afford a sufficient answer to a civil action of negligence has been discussed interestingly in a county court case by his honour Judge Konstam, K.C.[2] A cab driver suddenly swerved from his proper side and ran into a lorry. He immediately got out and stabbed himself several times with a carving knife. He said he had swerved to avoid a cyclist, and the medical evidence showed that no cyclist had been there and that the man suffered from hallucinations and delusions. The judge was satisfied that the swerve was due to the sudden impulse of an unbalanced mind, but found that the driver understood the nature and consequences of his act. He remarked that the question was not covered by any direct or binding authority. Lord Esher, in Hanbury *v.* Hanbury (1892), treated the test of responsibility as the same in criminal and in civil actions, but no question of negligence arose in that case. His honour quoted textbook writers who said that the question for the jury was whether the defendant was sufficiently self-possessed to be capable of taking care, and that the lunacy must be so extreme as to deprive its victim of all power of deliberate choice. Sudden illness, other than mental, which deprives its victim of the power of using skill and care is a good defence. The learned judge therefore concluded that there exists in law a sound distinction between negligence and other grounds of action. As this driver was not sufficiently self-possessed to be capable of taking care, and the swerve was not the conscious act of his volition, neither he nor his employers could be held responsible.

This judgment is not a binding authority, but seems to rest on solid foundations and to point to the tests which the High Court would probably apply in a similar case.

[1] *British Medical Journal*, September 9, p. 590.

[2] United Kosher Poulterers Ltd. *v.* Prouse. 1939: 6 *Law J.*, C.C.R. 241.

Experimental Pulmonary Embolism.—Intravenous injection of air, fat, or a starch suspension in rabbits caused changes in the electrocardiogram similar to those found in infarct of the heart muscle, and also changes typical of a right bundle-branch block (old nomenclature). In the majority of experiments the electrocardiogram returned to normal after recovery from the embolism, although widespread necroses were present in the wall of the right ventricle. These changes seem to be due to the sudden overloading of the right ventricle.—Electrocardiographic and Histological Examination of Heart in Experimental Pulmonary Embolism produced by Air, Fat, or by Starch Suspension. R. Walder.—*Beitr. path. Anat.* May 26, 1939, **102**, 485.

The Services

HEALTH OF THE ARMY IN PEACE

The report on the health of the Army for 1937[1] is the seventy-third such volume, which means that the first appeared in the 'sixties, when the sanitary reforms brought about by the Sidney Herbert Commission were beginning to have their effect. The present report gives us a picture of an Army healthier than it has ever been during that three-quarters of a century history. The same causes affect the health of the military and of the civil population, but conditions of selection and discipline in the Army favour a still higher standard, while, on the other hand, the soldier, particularly at foreign stations, faces certain liabilities which make him a more likely prey to disease. Of both soldier and civilian the paradox holds good that at a moment when their protection from disease was most assured, their liability to wounds, injuries, and violent death was never greater. The onslaught of disease has been stayed, but this other Moloch, whose blind strokes no medical wisdom can avert, gets a new momentum.

Hospital Admissions

The rate of admissions to hospital in 1937 decreased by 14.1 per 1,000 of strength as compared with the previous year, and was only 21.5 per 1,000 higher than the rate for 1935, which was the lowest recorded since the great war; while the death ratio of 1.97 per 1,000 and the ratio of 6.8 for invalids discharged from the Service were absolutely the lowest. The principal causes of admission to hospitals were influenza, inflammation of areolar tissue (chiefly boils and carbuncles), inflammation of tonsils, and venereal diseases. Influenza shows a considerable increase over the previous year. It heads the list of causes of admission in all the home commands except the Western, where inflammation of tonsils has that pre-eminence. The principal cause of invalidity leading to discharge from the Army was tuberculosis. It is worth noting in passing that the Royal Army Medical Corps had almost the highest incidence of pulmonary tuberculosis to be found in any unit.

The effect of common ailments on military efficiency varies according to the station. In the home commands local injuries account for the greatest number of lost days. By far the most common of these were fractures of the tibia and/or fibula and the radius and/or ulna, followed by the carpus or metacarpus. In India the commonest cause was malaria, although the rate for malaria was down on the year, and indeed was the lowest yet recorded. The reasons assigned for this satisfactory result are less rainfall, earlier onset of cold weather, more intensive applications of anti-malarial measures, and greater co-operation between civil and military health administrations. The treatment of malaria in India is carried out sometimes with quinine and plasmoquine, but usually with atebrin followed by plasmoquine. It is pointed out that the investigations under the auspices of the Malaria Commission of the League of Nations Health Organization have confirmed in every respect the careful initial work undertaken in the military hospitals in India on the use of synthetic drugs.

Value of New Drugs

An extensive trial has been made at nearly all the Army stations of drugs of the sulphonamide group, and it is stated that these drugs have effected the saving of life by overcoming infections by the streptococcus—not necessarily haemolytic—notably severe attacks of erysipelas and septicaemia, and that less severe disorders, such as pyelitis, cystitis, and other genito-urinary infections are rapidly cleared up by this form of treatment. Some forms of streptococcal tonsillitis have been found to get well quickly, while others appeared to resist the action of the drugs. Staphylococcal infections are

[1] H.M. Stationery Office. (2s. 6d. net., postage extra.)

not usually influenced, but one instance is recorded where staphylococcal septicaemia was rapidly brought under control. The reports from Army stations have encouraged the belief that this group of drugs will also reduce the mortality of cerebrospinal fever.

As to venereal diseases, it is mentioned that the polyvalent vaccine of mixed gonococcal and secondary organisms was tried in several areas with some measure of success, but this again has been abandoned in favour of sulphanilamide, which has been used in the treatment of gonorrhoea at home and abroad with apparently satisfactory results. The evidence available, says the report, indicates that it is a great advance on any treatment hitherto adopted. The dermatological specialist at Aldershot states that the whole atmosphere of the gonorrhoea wards has altered with the introduction of this new remedy. The patients, instead of being dull and troublesome, are now cheerful and anxious to get on with their treatment.

An interesting report is forthcoming from the vaccine department of the Royal Army Medical College, which supplies vaccines for the use of both the Army and the Royal Air Force. Increased demands were made in 1937 for all types of vaccines except the mixed influenza and catarrh vaccine, which is no longer recommended as a routine prophylactic. Over 99 per cent. of the troops and their families who embarked for service over-seas availed themselves of typhoid-paratyphoid inoculation. Diphtheria in 1937 showed a remarkable decrease among the Army population; this is credited to the immunization of the Army children, 95 per cent. of whom are now immunized with toxoid-antitoxin floccules. In another part of the report a great deal of useful information is included on the pathological work in the military laboratories in India.

Medical Examination of Recruits

It will be remembered that in 1936 the War Office decided that an attempt should be made to recondition applicants for enlistment who were below the standards for weight and chest measurement. Hitherto these men had been rejected outright. A course of special training for under-developed lads and border-line recruits suffering from various defects was instituted, and of those who completed this course in 1937, 90.5 per cent. were subsequently passed as fit. The after-history of these squads has been studied, and has shown that about one-third of them continued to make steady progress, and in most of the others there was intermittent progress. The average height and weight of all recruits enlisted in the home commands, other than the Southern Command, was 66.5 in. and 130.63 lb. respectively, but in the Southern Command a system has been instituted whereby heights and weights are recorded in age groups, and the other commands are now to adopt the same system. The average increase of weight among recruits under training during the year was 9.17 lb. This figure shows a fairly steady increase year by year. The chief cause of rejection is disease of the middle ear, including deafness. This cause accounts for more than twice as many rejections as either of the next two principal causes—namely, loss or decay of many teeth and defective vision.

In the light of the events of 1939 the year 1937 must be described as a year of peace, yet various operations were taking place in different parts of the world and were causing concern to those who had in charge the health of the British Army. The war in Spain, for example, caused Gibraltar to be overcrowded with refugees. In Palestine a number of troops were kept in conditions of field service, but the general health was good, and, although parts of Palestine are malarious, the malaria was well controlled. In India active operations were in progress in Waziristan, in which British and Indian troops were engaged, but here again health was very good, and sick rates were only slightly in excess of those obtaining in times of peace. For the first time evacuation of casualties was carried out by air from Waziristan, which is on the North-West Frontier. The number evacuated by air was just over 100, and the time as compared with road and rail was shortened by about five-sixths. Finally, in the Far East there was not only a major war but a cholera epidemic. Conditions were at their worst in Shanghai, with an appalling lack of sanitation, but the British troops were apparently almost immune. Only at Shanghai did any cases of cholera occur among military personnel; these numbered only five, and were considered to be due to neglect of orders and consumption of ice-cream from an unauthorized source. The outbreak of cholera among the civil population led to a much larger quantity of cholera vaccine than usual being supplied from the Royal Army Medical College. A strain of *Vibrio cholerae* obtained from Shanghai was incorporated in the vaccine.

Attention is being paid in every command to the hygiene of Army barracks. It is mentioned that at Gibraltar the polishing of the barrack floors is thought to have contributed to a decrease in the respiratory group of diseases—coughs, colds, and sore throats—which fell from 171 to 111 per 1,000 of strength. Married quarters are being improved, maternity and child welfare centres for soldiers' families are multiplying, and the report touches on many matters which favourably affect the comfort and well-being of the soldier and those dependent on him. More than half this volume is taken up with separate reports from the eight commands at home and the thirteen countries abroad in which the British Army is stationed.

MENTIONS IN DISPATCHES

Operations in Waziristan

The King has approved the promotion of Major M. P. Power, O.B.E., M.C., R.A.M.C., to be Brevet Lieutenant-Colonel for distinguished services rendered in the field in connexion with the operations in Waziristan.

The names of Lieutenant-Colonel J. R. N. Warburton, M.C., R.A.M.C., Major M. P. Power, O.B.E., M.C., R.A.M.C., Captain W. M. Stewart, R.A.M.C., Lieutenant-Colonel R. A. Logan, I.M.S., and Assistant Surgeon (Second Class) R. J. A. Ronto, I.M.S., have been brought to notice by the Commander-in-Chief in India for distinguished services rendered in connexion with the operations in Waziristan.

Operations in Palestine

The names of Colonel A. Hood, C.B.E., R.A.M.C., Major J. W. Malcolm, O.B.E., M.C., R.A.M.C., Captain K. G. F. Mackenzie, R.A.M.C., and Flight Lieutenant L. M. Crooks, R.A.F.M.S., have been brought to notice in recognition of distinguished services rendered in connexion with recent operations in Palestine.

CASUALTIES IN THE MEDICAL SERVICES

Royal Navy

Probationary Surgeon Lieutenant Herbert Julian Cornelius, R.N.V.R., who lost his life when H.M.S. *Royal Oak* was sunk by a submarine in Scapa Flow on October 14, took the M.R.C.S., L.R.C.P. as recently as January, and the M.B., B.S. of the University of London in June. He was elected a member of the British Medical Association on June 6.

DEATHS IN THE SERVICES

Surgeon Rear-Admiral Sir Patrick Brodie Handyside, K.B.E., C.B., R.N. (ret.), died at Gullane on October 15, aged 79. He was born in March, 1860, and was educated at Edinburgh Academy and the University of Edinburgh, where he graduated M.B., C.M. in 1883. Entering the Royal Navy as assistant surgeon in 1884, he became fleet surgeon in 1903 and surgeon rear-admiral on April 17, 1917. He was made C.B. in 1918 and K.B.E. in 1919. In 1918 he also received the Japanese Order of the Sacred Treasure (Second Class). As surgeon of H.M.S. *Fox* he served in the campaign of 1898 in Sierra Leone, landed with a force which took Manah Salya and Kwalin and rescued a party of eighty refugees, receiving the West African medal, with clasp for Sierra Leone. He married Lilly Chester, daughter of Lieutenant-Colonel H. M. Blenkinsop, late I.M.S. He had been a member of the British Medical Association for forty-three years, and at the Annual Meeting of the Association held at Brighton in 1913 he was vice-president of the Navy, Army, and Ambulance Section.

Major-General William Charles Hughan Forster, C.I.E., I.M.S. (ret.), died suddenly at Northlew, Devon, on October 11, aged 65. He was born on June 15, 1874, and was educated at

Edinburgh University, where he graduated M.B., C.M., with honours, in 1896, subsequently taking the D.P.H. at Cambridge in 1899. After filling the posts of house-surgeon for out-patients at Edinburgh Royal Infirmary and assistant resident medical officer at the National Hospital for Consumption, Ventnor, he entered the Indian Medical Service as lieutenant on July 27, 1899, attaining the rank of colonel on November 27, 1927, and of major-general on November 5, 1929. He retired on July 19, 1933. After four years of military duty he entered civil employ in April, 1904, as deputy sanitary commissioner in the Punjab. In April, 1909, he was appointed professor of hygiene and pathology in the Lahore Medical College and in August, 1918, became sanitary commissioner of the Punjab, the title of his office being changed to director of public health in November, 1921. On promotion to the administrative grade in 1927 he was posted to the inspector-generalship if civil hospitals in Burma, and in November, 1929, he was promoted to surgeon-general of Bombay, with the rank of major-general. In 1932–3 he was a member of the Bombay Legislative Council. He served on the North-West Frontier of India in the Waziristan campaign of 1901–2, receiving the frontier medal with a clasp. He was the author of several articles in *Scientific Memoirs*.

Lieutenant-Colonel Thomas Biggam, R.A.M.C. (ret.), was born on January 15, 1874, and was educated at the University of Edinburgh, where he graduated M.B., Ch.B. in 1897. He entered the R.A.M.C. as lieutenant on April 25, 1900, became lieutenant-colonel on December 26, 1917, and retired on April 30, 1920. He served in the South African War, when he took part in operations in Cape Colony in 1900, and in the China War of 1900, receiving the medal.

Lieutenant-Colonel Gilbert Henry Dive, D.S.O., R.A.M.C. (ret.), was born in New Zealand on May 29, 1882, and was educated at Wanganui College, the University of Otago, and St. Bartholomew's Hospital. He took the M.R.C.S., L.R.C.P. in 1906, the M.R.C.P. in 1910, the D.P.H.Oxford in 1911, and the D.T.M. and H. of the English Colleges in 1925. He was house-physician at the West London Hospital in 1907 and house-surgeon at St. Bartholomew's Hospital in 1908–9. He entered the R.A.M.C. as lieutenant on July 31, 1909, and was clinical assistant to the professor of tropical medicine at the Military Hospital, Millbank, from 1910–12. He was a member of the British Expeditionary Force at Tsingtau in 1914, when he was mentioned in dispatches. He received a brevet majority on January 1, 1918, became major on July 31, 1921, and retired on May 29, 1937, shortly after his promotion to lieutenant-colonel. He served in Belgium and France in the war of 1914–18, when he was mentioned four times in dispatches. He received the D.S.O., the Medaille d'Honneur des Epidémies, and the Croix de Guerre. He had been a member of the British Medical Association since 1926.

Universities and Colleges

UNIVERSITY OF OXFORD

Sir Charles Sherrington, O.M., G.B.E., M.D., F.R.S., formerly Waynflete Professor of Physiology in the University, has been elected to an honorary Fellowship at Magdalen College.

UNIVERSITY OF CAMBRIDGE

The outgoing Vice-Chancellor, Professor H. R. Dean, M.D., F.R.C.P., Master of Trinity Hall, has been elected to the Council of the Senate.

At a congregation on October 21 the following medical degrees were conferred:

M.B., B.Chir.—*N. Langdon-Down, *G. Oppenheimer, *D. L. Ridout, *A. M. Ogilvie, *G. S. Robinson, *A. Hargreaves, J. D. Younghusband, N. J. P. Hewlings, J. C. R. Nuttall-Smith, J. B. Murray, B. W. Powell, J. W. Shackle.

M.B.—*J. G. Warren, *L. J. Haydon.

* By proxy.

UNIVERSITY OF LONDON

London School of Hygiene and Tropical Medicine

The following candidates have been approved at the examination indicated:

Academic Postgraduate Diploma in Public Health.—Eva M. Cran, M. Daniels, Christina A. Gunn, S. M. H. Naqvi, G. H. Shaw, C. S. Thomson, N. V. Williams.

UNIVERSITY OF DURHAM

The following candidates have satisfied the examiners at the examination indicated:

Final M.B., B.S.—J. K. Adamson, M. Anderson, D. O. Bowes, Sheila D. M. Brown, W. E. Chapman, Margaret I. Dufty, F. N. C. Evans, R. J. Gray, J. D. S. Hethcote, S. Hickling, K. J. Higham, A. F. Hutchison, J. W. G. McDougall, E. A. Milner, R. H. Richardson, T. J. W. Robson, J. P. Simpson, T. D. Todd.

UNIVERSITY OF WALES

The following candidates have satisfied the examiners at the examination indicated:

Diploma in Public Health.—*Part II:* H. L. Ackerman, D. J. Davies, S. H. Graham, C. T. Jones, J. J. O'Reilly, J. Paterson, H. R. Stubbins, *A. J. Thomas.

Welsh National School of Medicine

The following candidates for the degrees of M.B., B.Ch. have satisfied the examiners at the examination indicated:

Hygiene.—Mary E. Budding, Doreen M. E. Cranch, Enid Curran, *Joan B. Davies, T. C. H. Davies, I. L. R. Evans, D. I. Harries, Marguerite J. Hennelly, Helen C. Hodges, *D. D. Howell, O. Howell, D. H. Jenkins, R. T. Jenkins, G. A. Jones, J. V. Jones, Anne N. M. Llewhelin, J. E. Lloyd, Mary E. Lloyd, S. Love, Brenda M. Mead, D. G. Morris, R. E. Packer, Mary G. Powell, H. V. Roberts, D. C. Taylor, C. E. Thomas, T. Walker.

* With distinction.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

A quarterly meeting of the Council of the Royal College of Surgeons of England was held on October 12, with the President, Mr. Hugh Lett, in the chair.

Mr. R. St. Leger Brockman was re-elected a member of the Court of Examiners for a further period of five years.

Mr. H. F. Humphreys was re-elected a member of the Board of Examiners in Dental Surgery for a further period of five years.

It was decided to cancel the arrangements for holding the forthcoming primary examinations for the Fellowship in India, Egypt, and Australasia.

It was not found necessary to make any change in the regulations for the Primary or Final Fellowship examinations during the war.

It will be possible to conduct the Fellowship and dental examinations in London in the normal way on the next occasion.

The following arrangements have been made regarding Lectures: Arnott and Erasmus Wilson demonstrations, the autumn series has been cancelled; Hunterian Lectures, the lecturers will be asked to deliver their lectures if able to do so, if unable, they may publish the lecture and use the title "Hunterian Professor"; Moynihan Lecture, to be given by Professor Ernest W. Hey Groves in March, 1940; Thomas Vicary Lecture, to be given by Sir Walter Langdon-Brown as arranged on November 30, but at 3 p.m.; Bradshaw Lecture, to be given by Sir James Walton as arranged on December 14, but at 3.30 p.m.

The Licence in Dental Surgery

Until further notice the following relaxation in the regulations for admission to the examinations for the L.D.S., R.C.S., will be effective:

1. The two-years instruction in dental mechanics is reduced to eighteen months, of which not less than twelve months must be taken at a required dental school.

2. Instruction in dental mechanics is recognized from the date of passing in two of the three subjects of the pre-medical examination (chemistry, physics, biology), but the pre-medical examination must be completed before admission to the first examination.

3. The instruction in anatomy and physiology, including special anatomy and physiology, may be signed for thirty weeks, which *may* be consecutive.

4. Where arrangements are impracticable for the ordinary two years' clinical work in dental surgery, during the first of which general medicine, surgery, and pathology are taken, a six-months course of instruction in egneral medicine, surgery, and pathology, followed by eighteen months of clinical work in dental surgery, will be accepted.

5. It will be seen that these relaxations reduce the total curriculum to three and a half years from the date of passing in two subjects of the pre-medical examinations, the six months being taken off the instruction in dental mechanics.

6. In the examinations, candidates will not be expected to work in gold, but in base metal only.

The Museum is closed but the Library will remain open until further notice. The Buckston Browne Dinner will not be held this year. The annual meeting of Fellows and Members will be held on November 16, at 3 p.m., and not 4 p.m. as previously arranged.

Diplomas of Fellowship were granted to Eric Samuel and Robert Clarence Laird.

Diplomas of Membership were granted to Phiroz Burjor Banaji, Robert Douglas Neil Bisset, John David Dudley Boswell, John Cuthbert Herapath, Henry Edwin Hobbs, Frederick Grafton Lougee, Simon Meleck, Puzhankara Ananakumara Menon, Frank Bradbury Norrish, John Ffrangçon Roberts, Allan Robert Frederick Thompson, Michael Milnes Walker, John Fisher Williams.

ROYAL COLLEGE OF SURGEONS OF EDINBURGH

At a meeting of the Royal College of Surgeons of Edinburgh held on October 17, with Mr. W. J. Stuart, President, in the chair, the following, having passed the requisite examinations, were admitted Fellows:

H. Ahmed, D. I. Adler, Y. N. Ajinkya, G. M. Arnott, H. A. Bali, S. P. Barnett, D. Barton, J. E. M. Cairncross, C. F. Chapple, H. M. Coleman, W. M. Couper, J. F. Curr, G. H. Darke, G. S. Dhillon, N. N. Dravid, A. S. Duncan, J. T. Farr, H. L. Fuller, F. W. Grauer, J. H. Hofmeyr, I. Karro, J. A. Kersley, A. A. Khan, G. D. Killawala, J. A. Kilpatrick, D. H. Lees, A. Lutton, J. Macaskill, J. K. McCollum, W. McKechnie, C. M. Marsden, G. D. Matthew, R. Mundy, D. F. O'Brien, A. Orlek, J. H. Pierre, D. A. Reid, J. W. R. Rennie, R. Roaf, H. G. Roberts, Juliet M. De Sa, J. A. L. Scott, G. C. Sen, F. D. Smith, E. Somasekhar, A. Trottier, F. R. Tucker, J. R. A. White, L. J. Wigston, J. D. Wilson.

At the annual meeting of the Royal College of Surgeons of Edinburgh, held on October 18, the following officers were elected for the ensuing year:

President, Dr. H. M. Traquair. *Vice-President*, Mr. W. J. Stuart. *Secretary and Treasurer and Conservator of Museum*, Mr. J. W. Struthers. *Representative on the General Medical Council*, Mr. Alex. Miles. *Convener of Museum Committee*, Mr. W. Quarry Wood. *Librarian*, Mr. J. J. M. Shaw.

EPIDEMIOLOGICAL NOTES

Infectious Diseases for the Week

The customary seasonal increase in the incidence of scarlet fever, diphtheria, and pneumonia (primary and influenzal) in England and Wales during the autumn has been observed during the week, but the numbers notified are well below the level of the corresponding week in 1938. The effect of the abnormal distribution of an appreciable proportion of susceptible subjects would appear on the whole to be a favourable one from the epidemiological standpoint, although it is too early to ascribe the lowered incidence solely to this factor. In Eire and Northern Ireland, where there has been no such movement of children, diphtheria has remained below and scarlet fever in excess of the figures recorded last year. To a lesser degree the same holds true for Scotland. The effect of the evacuation of large numbers of children in England is exemplified by comparison of the number of notifications of scarlet fever, diphtheria, and pneumonia in the four largest cities during the present week and the corresponding week last year, the figures for which are given in parentheses:

	Scarlet Fever	Diphtheria	Pneumonia
London ..	32 (180)	25 (125)	24 (47)
Manchester	12 (33)	12 (17)	3 (20)
Birmingham	18 (31)	22 (36)	11 (27)
Liverpool	23 (35)	29 (16)	9 (15)

It is seen that while the decreases for these diseases in England and Wales vary from some 10 to 25 per cent., notifications in these cities have fallen in some instances to a fraction of their value last year—for example, scarlet fever in London fell to one-sixth. The pneumonia figures are naturally less affected as adults are attacked more frequently than children; the observed reduction in the incidence of pneumonia may be due in part to climatic factors, to which, to some extent, may be attributed the general fall in scarlet fever and diphtheria. Dysentery is also below last year's level, although it has increased somewhat recently, the notifications for the last three weeks being 22, 23, 37. Notifications were received from twelve counties, and only one town or district in each county was affected. More than 3 notifications were recorded in Orpington (Kent) 9, Warrington (Lancaster) 6, Amersham (Bucks) 4, Colchester (Essex), Devizes (Wilts), and Bristol (Gloucester) 3 each.

Acute Poliomyelitis

The distractions of war have perhaps in part diverted attention from the fact that poliomyelitis has reappeared in the form of outbreaks, although the weekly notifications for the whole country have at no period reached the 1938 level. In the last four weeks notifications for England and Wales were 29, 38, 43, 42 (present week), compared with 76, 60, 56, 65, in the corresponding weeks of last year. The sporadic and widely distributed character of the disease is illustrated by the fact that twenty counties are at present affected, giving a weekly average of 2 per county. Essex, which was severely hit last year, has practically escaped, while the adjacent county of Kent, across the River Thames, has produced the largest number of cases so far, urban and rural areas being equally involved. Counties reporting more than two cases were Kent 9 (Herne Bay 2, Dover urban, Dover rural, Gillingham, Maidstone urban, Maidstone rural, Whitstable, Queenborough, 1 each); Lancaster 5 (St. Helens 2, Blackburn, Bolton, Littleborough, 1 each); Middlesex 5 (Willesden 2, Harrow 1, Ruislip and Northwood 1, Yiewsley and West Drayton 1); Warwick 3 (Birmingham, Rugby urban, and Coventry, 1 each).

Dysentery in Europe

Notification of dysentery is in force in all European countries with the exception of Portugal and Albania, but the accuracy of the data varies greatly in different countries and even in different areas of the same country, according to the facilities for diagnosis and collection of records. The distinction made in notification between the bacillary and amoebic forms of the disease is only enforced in Holland, Italy, Rumania, and Turkey. The Balkans are chiefly affected, and generally speaking the bacillary form is predominant. As in respect of enteric infections generally, dysentery has its maximum prevalence in the late summer and autumn months. In 1938 the maximum was reached in August and September in Germany and Hungary, in August in Rumania, Czecho-Slovakia, and Yugoslavia, and in October in Poland. In Germany the yearly numbers reported have varied from 2,525 with 122 deaths in 1933, to 7,545 with 181 deaths in 1937, while in 1938 there were 5,255 cases and 161 deaths. The character of the disease has apparently become less virulent, although in some other countries the reverse has been observed. In Hungary, for instance, the disease has become both more prevalent and more fatal; there were 1,385 cases with 260 deaths in 1933, and 6,441 cases with 717 deaths in 1938. The situation has been even worse in Poland and Rumania, in which countries there were 6,398 cases with 703 deaths and 6,459 cases with 1,182 deaths, respectively, in 1938. In Czecho-Slovakia and Yugoslavia there have been considerable fluctuations in the last few years; in the former notification fell from 3,059 cases (334 deaths) in 1937 to 639 cases (67 deaths) in 1938; in Yugoslavia the corresponding figures were 2,358 (148 deaths) and 1,278 (104 deaths).

Blood Alcohol.—In a comprehensive paper McGrath describes fully the method of estimation of blood alcohol, the various factors which may influence the concentration of alcohol in the blood, and the medico-legal aspects of the test. The test does not supply an automatic answer to the question "Was the individual drunk?" but may indicate, almost with certainty, that a person was sober at the time of taking the blood sample.—Method and Significance of Blood Alcohol Estimations. J. McGrath.—*Irish J. med. Sci.* July, 1939, 6, 304.

No. 40

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended October 7, 1939.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for : (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for : (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases ; a blank space denotes disease not notifiable or no return available.

Disease	1939					1938 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	18	3	9	2	—	14	1	4	—	—
Deaths		—	1				1	1		
Diphtheria	952	25	223	29	28	1,166	125	202	53	32
Deaths	19	—	5	2	1	28	2	6	3	—
Dysentery	37	1	69	—	—	45	12	16	—	1
Deaths			1	—	—			—	—	—
Encephalitis lethargica, acute	2	—	—	—	—	5	—	2	—	—
Deaths		1	1				—	—		
Enteric (typhoid and paratyphoid) fever	39	5	3	3	4	24	5	12	5	1
Deaths	3	2	—	2	—	1	—	—	1	—
Erysipelas			57	8	4			63	6	5
Deaths		—	—				1	—		
Infective enteritis or diarrhoea under 2 years										
Deaths	28	5	23	8	12	57	7	13	16	3
Measles			8		11		24	17		3
Deaths	1	—	—	—	1	1	—	—	—	—
Ophthalmia neonatorum	85	2	14		—	94	10	28		1
Deaths										
Pneumonia, influenzal*	379	24	7	—	6	453	47	5	1	12
Deaths (from influenza)	14	3	3	—	2	22	2	—	1	—
Pneumonia, primary			102	10				152	6	
Deaths		3		6	5		8		7	2
Polio-encephalitis, acute	2	—				3	1			
Deaths		—					—			
Poliomyelitis, acute	42	1	—	1	1	65	6	8	1	1
Deaths		—	—				1	1		
Puerperal fever	3	3	16	3	1	7	7	13	1	1
Deaths		1†					1†			
Puerperal pyrexia	150	7	17		1	176	16	16		3
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,263	32	214	65	92	1,734	180	389	56	89
Deaths	1	—	—	—	—	—	—	—	—	—
Small-pox	—	—	—		—	—	—	—		—
Deaths		—	—	—	—		—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough			17		4		43	109		6
Deaths	5	—	—	—	—	8	—	2	1	—
Deaths (0–1 year)	267	24	68	27	30	288	43	55	36	15
Infant mortality rate (per 1,000 live births)						48	35			
Deaths (excluding stillbirths)	4,370	669	588	185	150	4,062	745	541	163	125
Annual death rate (per 1,000 persons living)			11.9	12.4	13.2	10.0	9.5	11.0	11.0	11.1
Live births	5,324	736	812	270	208	5,981	1,180	852	330	199
Annual rate per 1,000 persons living			16.4	18.2	18.3	14.7	15.0	17.4	22.3	17.6
Stillbirths	208	12	43			225	30			
Rate per 1,000 total births (including stillborn)			50			36	25			

* Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.
† Death from puerperal sepsis

Medical Notes in Parliament

Business in the House of Commons this week included discussion of British relations with India and progress with the Prices of Goods Bill.

There has been presented to the House of Commons a copy of an international agreement revising the Agreement of 1906 respecting the unification of pharmacopoeial formulae for potent drugs. The revised agreement was signed at Brussels in August, 1929, and His Majesty's Government in the United Kingdom acceded to it on August 1, 1939.

More Hospital Beds in Scotland

Mr. COLVILLE, answering Sir Charles MacAndrew on October 18, announced arrangements under which additional hospital facilities provided under the Emergency Casualty Hospitals Scheme in various parts of Scotland would be available up to the limit of their capacity not only for civilian war casualties but also for ordinary sick persons in those areas who were in urgent need of hospital treatment which could not be obtained elsewhere. The additional hospital beds under the scheme would come into commission in increasing numbers in the near future.

Local authorities and other hospital authorities would be informed as these additional beds became available in areas suitable for their purposes, and full instructions would be given as to the procedure for the admission of patients and for the recovery of the cost of treatment in suitable cases.

Thefts of Drugs from Cars

Mr. ALFRED EDWARDS asked Sir John Anderson on October 19 if, in view of the many cases of dangerous drugs stolen from the cars of medical practitioners, he would take steps to ensure that such persons were penalized for their neglect. Sir JOHN ANDERSON replied that it was important that special care should be taken as regards the custody of drugs, but he knew of no ground for the suggestion that legislation was required to check carelessness by medical practitioners. The Home Office only heard of fourteen cases in the last twelve months where drugs had been included among articles stolen from cars. In ten of these the drugs were recovered intact.

Dr. HADEN GUEST: Is there any foundation for the suggestion that a large number of these losses has taken place? It seems rather a slur on the medical profession.

Mr. A. EDWARDS asked if Sir John Anderson knew that the B.B.C. frequently had to warn people of these occurrences and against taking the drugs.

Sir John did not reply to these questions.

Welfare Services in War Time

Mr. GEORGE GRIFFITHS asked on October 19 when the antenatal and the child welfare centres and the tuberculosis dispensaries of local authorities would resume their normal activities. Dr. ELLIOT answered that local authorities generally were using their best endeavours to remedy such disturbances as had been caused by war conditions in these services. His policy was to encourage this process to the utmost. The extent of the service required in any particular area might have been increased or decreased as the result of changes in the distribution of the population, so it was scarcely possible to say when a condition which could be described as normal would be reached in all areas.

On October 24 Mr. D. ADAMS asked the Minister of Health whether he would take steps to ascertain whether attendances at child welfare clinics were being maintained. Miss HORSBRUGH replied that welfare authorities generally were doing their best to maintain these services, and the Ministry's regional medical staff were asked to keep the position in different localities under review. It was desirable in present circumstances to keep down specific requests for information from the Ministry to local authorities as far as possible. Miss Horsbrugh also assured Mr. D. Adams that, in weighing the needs of the nation in financial and other respects, the Government would attach full importance to the adequate maintenance of the health services, which they recognized as a necessary part of the nation's requirement in war as well as in peace.

Personnel of Medical Boards

On October 19 Mr. T. GROVES asked why in Surrey two medical men received £1,000 per year for examination of recruits for the Forces, whereas in the same area other available doctors were denied the opportunity of acting for such boards. Mr. ERNEST BROWN answered that there were five medical boards in Surrey, members of which were drawn from panels consisting in all of over seventy practitioners. He did not think any increase in this number necessary. Payment was made not at a fixed annual rate but by fees according to the number of sessions attended. He would inquire into the distribution of the work among the members of the panels, but was not aware of any dissatisfaction in this matter. Nor was he aware of any general dissatisfaction among members of the medical profession with the personnel of medical boards. He received representations last August from the Medical Practitioners' Union with regard to the method of selecting this personnel. He was not satisfied that any change was necessary.

Tuberculosis Services in Wales

Dr. ELLIOT told Mr. James Griffiths on October 19 that action on the Report on Anti-tuberculosis Services in Wales had unfortunately been interrupted by the war. He could not say how soon it would be possible, in the new circumstances, for the authorities concerned to complete their consideration of the matters involved. Hutted hospitals in Denbigh and at Chepstow were being proceeded with. These would be of assistance, subject to the requirements of the casualty service, in connexion with tuberculous patients.

Payment of Doctors in Reception Areas

Dr. ELLIOT said on October 19 that he was not aware that medical men in certain areas to which children had been evacuated were informed that payment could not be made out of the funds provided for the medical attendance and treatment of these children unless such medical men had joined the scheme for the protection of practices instituted by a voluntary organization of medical men. He had not sanctioned such procedure. He had received a complaint that the condition was being imposed in one area, but had ascertained on inquiry that this complaint was without foundation.

Second Evacuation of School Children

The supplementary scheme of evacuation, which is confined to unaccompanied school children, has been carried out in several areas, and will be completed in all the evacuating areas in the next two or three weeks. Dr. Elliot has given orders that evacuating authorities shall carry out medical inspection and, if necessary, treatment of all children in the parties.

In a reply on October 19 to Mr. McEntee, Dr. ELLIOT announced that about 11,000 expectant mothers and 445,000 mothers and young children were evacuated at the outbreak of war. He now awaited a return from local authorities of the numbers who still remained in the reception areas.

Compensation for Civilian War Injury

In the House of Commons on October 24 Mrs. ADAMSON moved for an address to the King asking for the annulment of the Personal Injuries (Civilian) Scheme, 1939. She said that the scheme was not wide enough. She objected to the provisions affecting women and children, particularly in regard to injuries and pensions allowances for wives. Dr. EDITH SUMMERSKILL, in seconding the motion, said that in fixing the children's allowances the Government was advised by men who were scientifically out of date and were thinking in terms of nineteenth century medical science.

Sir FRANCIS FREMANTLE said that Dr. Summerskill was wrong in saying that the Government was receiving out-of-date medical advice. She ought to know that the Medical Research Council was as up to date and as progressive as any body of beings could be in this country. Dr. Summerskill, interposing, said she had not attacked the Medical Research Council. Sir Francis Fremantle said that to meet all the criticisms which had been made during the debate would cost the country tens of millions of pounds. He agreed, however, with the criticism of the limitation imposed on the number of children to be provided for.

Sir WALTER WOMERSLEY, replying to the debate, said that the scheme was an essential part of the general arrangements for the relief of war distress. In fixing these terms their decision had to be governed by the over-riding consideration that the resources of the Government for compensation for injury to persons were not unlimited. The scheme of compensation for war injury was not the last word, and when the war was over he believed that the House would insist on a review of the whole position. The Government had clearly laid down the principle that there could be no inherent right in the general population for compensation for the fact of injury, and that any liability accepted by the State towards those injured in the performance of public service must be in respect of actual loss resulting from injury. It was reasonable to limit compensation in respect of injury to persons not gainfully occupied to cases in which family circumstances gave evidence of actual need. An interdepartmental committee was inquiring into the anomalies with regard to children's allowances, and he hoped that a report would soon be forthcoming.

The motion for an address was negatived by 137 votes to 113, a Government majority of 24.

Hospital Treatment of Civilian Population

Dr. ELLIOT, replying to Mr. D. Adams on October 24, said that the accommodation in existing hospitals in England and Wales had been increased by the introduction of 100,000 additional beds, together with the necessary equipment; and arrangements had been made to provide the medical and nursing staff required for these beds. Beds were at present available in the hospitals of this country for all civilians in need of in-patient treatment. The building of huts to accommodate 38,000 further beds was well advanced, and some of these huts were already completed and equipped for immediate use. Every effort was being made to accelerate the completion of the remainder. It was his desire and intention that the necessity for providing hospital accommodation for members of the Forces should not prevent treatment being given to civilians whose health was in danger, and he trusted that the local hospital authorities, especially in areas such as Tyneside, where long waiting lists existed before the war, would make every possible use of the additional accommodation which was at present being provided in their areas.

Institutional Treatment of Tuberculous Persons

On October 24 Dr. ELLIOT, replying to Mr. Parker, said there was no question of the treatment of tuberculosis being at a standstill. While it had been necessary for such tuberculosis institutions as were included in the Emergency Hospital Scheme to keep a certain number of beds available for casualties, any consumptive requiring institutional treatment ought to be receiving it. Letters were now being sent to a number of these institutions releasing them for the present from any obligation to keep even a percentage of beds available under the Emergency Scheme, and these institutions would therefore be able to take in patients exactly as in normal times. Any discharged persons suffering from tuberculosis who would benefit by further treatment in an institution or who would act as sources of infection in their homes should at once be readmitted. The care and attention of tuberculous persons living at home was not at any time a normal function of a sanatorium except at a few special institutions, but was undertaken by the family medical attendant and the tuberculosis dispensary organization acting in co-operation.

Medical News

The Library of the British Medical Association will be open from 9.0 a.m. to 5.0 p.m. (1.0 p.m. Saturday) until further notice.

In view of the coming dark days the out-patient department of the National Hospital for Diseases of the Nervous System (Queen Square, W.C.) will, from October 30, be open daily at 9.30 a.m., except on Saturdays.

The annual public meeting of the Save the Children Fund, which was to have been held on October 28, with the Chinese Ambassador as principal speaker, has been abandoned owing to war conditions.

Owing to the outbreak of war it has been found necessary to cancel the members' meetings of the Eugenics Society arranged for November 21 and December 15. It is hoped to be able to resume the meetings in the early spring.

Unless cancelled by reason of the war, the next congress of the International Association of Women Doctors will be held at Budapest in 1940, when the following subjects will be discussed: (1) the hygiene of school children from the point of view of nutrition, school work, physical culture, and sleep; (2) the principles, methods, and results of anti-venereal legislation.

Before the outbreak of war arrangements were being made for the third All-India Obstetric and Gynaecological Congress to be held in Calcutta in December next. The subjects chosen for discussion were: (1) anaemia of pregnancy; (2) functional uterine haemorrhage; and (3) maternity and child welfare. Further information can be obtained from the secretary, Dr. S. Mitra, 3, Chowringhee Terrace, Calcutta.

The newspapers record that for the fourth time in thirty-six hours Dr. F. J. S. Hall of Deal went out in the Walmer lifeboat last week in a Channel gale in answer to S O S calls for medical aid from vessels anchored off Deal.

The Swiss League against Cancer will hold its annual meeting at Coira, Grisons, on November 25 and 26.

The *Gazette des Hôpitaux* states that the American hospital at Neuilly, Paris, has offered 500 beds for the French wounded and 1,500 more at its annexe at Etretat.

The issue of *Le Journal Médical Français* for July is devoted to the clinical, demographic, and social study of criminal abortion, and the issue of *Le Bulletin Médical* for August 26 to neuropsychiatry.

At the third International Congress of Neurology held at Copenhagen from August 21 to 25, which was attended by about 500 neurologists from all countries, it was decided that the next congress should be held in Paris in 1942 or 1943.

Owing to the absorption of psychological personnel by official emergency organizations for the treatment of mental casualties, a need has arisen to provide psychological guidance and treatment for those who, although not direct casualties, are suffering from nervous crises owing to war conditions. To meet this need the London Clinic of Psycho-Analysis (96, Gloucester Place, W.1) has organized a temporary psychological aid centre to be opened on Friday, November 3. Three units have been arranged for the purpose of providing advisory consultations and short emergency treatments on Mondays at 2 p.m., Wednesdays at 3 p.m., and Fridays at 2 p.m. The ordinary psycho-analytical routine of the clinic will not be affected by this auxiliary service. Analytical treatments will be carried on as before, and analytical consultations will be given at the usual time—namely, each Tuesday at 5 p.m. If necessary emergency treatments will also be provided on this day. In addition to the treatment of psychoneurotic crises, each unit will be ready to deal with disturbances of character and to advise on various psychological problems arising out of emergency conditions.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to The EDITOR, British Medical Journal, B.M.A. House, Tavistock Square, W.C.1.

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone, unless the contrary be stated. Correspondents who wish notice to be taken of their communications should authenticate them with their names, not necessarily for publication.

Authors desiring REPRINTS of their articles published in the *British Medical Journal* must communicate with the Secretary, B.M.A. House, Tavistock Square, W.C.1, on receipt of proofs. Authors over-seas should indicate on MSS. if reprints are required, as proofs are not sent abroad.

ADVERTISEMENTS.—All communications should be addressed to the Advertisement Manager (office hours 9 a.m. to 5 p.m.). Orders for copies of the *Journal* and communications with reference to subscriptions should be addressed to the Secretary, B.M.A. House.

The Telephone Number of the British Medical Association and the *British Medical Journal* is EUSTON 2111.

The Telegraphic Addresses are
EDITOR OF THE *BRITISH MEDICAL JOURNAL*, *Aitiology Westcent, London.*
SECRETARY, *Medisecra Westcent, London.*

The address of the B.M.A. Scottish Office is 7, Drumsheugh Gardens, Edinburgh (telegrams: *Associate, Edinburgh;* telephone 24361 Edinburgh), and of the Office of the Cumann Doctúirí na h-Éireann (I.M.A. and B.M.A.), 95, Merrion Square, W., Dublin (telephone 62550 Dublin).

QUERIES AND ANSWERS

Testosterone for Enlarged Prostate

Dr. C. Horwitz (London, N.1) writes: I have a case of slightly enlarged prostate in a man aged 53 years. I would like to hear the experiences of any of your readers with regard to the use of testosterone propionate in such a case.

Fractured Femur in the Field

Dr. W. R. Wilson (Doncaster) writes: During the last war Captain F. B. Chevasse described in your columns a novel way of dealing with fractured femurs in the field (October 5, 1918, p. 373). Can you, please, or any of your readers, say to what extent it was used, and whether it stood the test of experience? The plan was to fasten the foot of the broken limb to the end of the stretcher and then elevate this end with the man on it up to 45 degrees (or more), allowing him to remain so until a convenient opportunity for evacuation. A strap or strong band was passed between the legs and made fast to the head end, tightly enough to maintain the amount of extension that had been achieved by the man's own weight. (Thomas's knee splint is very good, but it may not always be available when a stretcher is.) With sundry other bandaging the man was ready for carrying in the horizontal position.

Sawdust Bags for Wounds

Mr. K. Knowles, F.R.C.S.Ed., writes: I am sure many will welcome Mr. Ian Fraser's letter on war hospital supply depots (*Journal*, October 21, p. 829). Bags filled with fine sawdust have for very many years been used in the large C.M.S. Hospital, Srinagar, for discharging wounds. They are easily prepared and sterilized, and are cheap as well as satisfactory.

Income Tax

Refresher Course Expenses

"Medicus" has claimed to deduct under Schedule D expenses incurred in a refresher course not directed to the taking of a degree; the inspector of taxes has refused the claim.

*** The point has not been the subject of judicial decision, but we understand that the claim made by "Medicus" is allowed generally with the agreement of the Board of Inland Revenue. Where the course is not taken with a view to the obtaining of a degree, or to the expanding, as distinct from the bringing up to date, of the medical knowledge of the practitioner, the expense is analogous to the maintenance of the medical library or equipment and is allowable. We suggest that "Medicus" should ask his local inspector of taxes to submit the point to his headquarters.

Amount of Tax Payable

"Conjoint" inquires what tax will be payable under the new Budget on a salary of £500 or £450 a year respectively less £102 expenses by a married man with one child.

*** The calculation is as follows:

Salary less expenses..			£398
Allowances: Earned Income	£80		
Personal	£180		
Child	£60		
		£320	
Tax payable at 2s. 4d. on..			£78

that is, £9 2s.

Assuming no further change next year than those already provided for, the tax payable for 1940–1 will be £21. On a basis of £450 less £102 expenses the tax payable for this year and next year would be £4 8s. 8d. and £13 2s. 6d. respectively.

LETTERS, NOTES, ETC.

A Students' Register: Correction

The Dean of the Faculty of Medicine of Liverpool University writes: May I point out, in reference to an incorrect statement in the *British Medical Journal* for October 21, 1939 (p. 821—article entitled "A Students' Register"), that my predecessor in the Deanship sent to the General Medical Council on November 30, 1938, lists of students of medicine who commenced professional study at the University of Liverpool in 1938.

Evacuation of Women and Children

Dr. Esther Carling writes from Aylesbury: After a month of stocktaking and hard thinking certain facts seem to emerge. (1) There is no criticism of the central idea that children should be protected; but (2) indiscriminate billeting can only be tolerated as a very temporary emergency measure; (3) the casting forth of mothers and children under 5 has been in the main a failure. Put these facts against the constantly reiterated Government plea that parents in evacuation areas should think again before rejecting the offer of safety. Then consider how the rural end of the problem can be adjusted to the Government's decision. First take the question of loyalties. Is the town mother in a danger zone to put her young children before her home and her husband? Can she wisely forgo the claim of the family as the unit? Had they not better stand or fall together? Must she accept the dictum, "Women and Children first?" That involves the further question, Are women human first or women first? If human theirs is the right to choose, but if their sex differentiation is their main function then they must have priority treatment. Population experts stress the value to the race of its women of child-bearing age, and in this way scientific research bears out the finding, "Women and children first." Doubtless the Government had this in mind in framing its schemes for the evacuation of mothers. The plan has failed not only from the incompatibility of town and country, or the difficulty of adjusting richer to poorer, clean to less clean, etc., but also because of the essential question, "What is my duty, where do I belong?" If country people are asked for a considered opinion they would stress the need for crêches or nursery schools as the solution for the youngest children. Then they will hear of prohibitive cost and will become uncomfortably conscious of their own unoccupied rooms. The value of such rooms has suddenly gone up. We who have them should be prepared to pay for them more highly than we have ever paid: they mean more to us. We have learnt by very uncomfortable contact how the other half of the world lives, and we have seen that the other half appreciates us as little as we appreciate them. Town mothers shot into the country are not grateful, and the rising tide of country resentment matches the objections of the unwilling guests. For the children, then, camps and crêches—cost us what they may. For the mothers let us think again, and at any rate respect their right to decide where and how their duty lies.

Examination by Medical Boards

Dr. J. Aickin (Ferryhill), in reply to Dr. G. de Swiet's letter in the *Journal* of October 14 (p. 785), writes: If he will give the candidate a drink of cold water and wait a few moments he will have no difficulty in getting a sample. Some manage better if given the test glass and sent to the w.c. What I find to be a much greater difficulty is the number of men with impacted cerumen in one or both ears, making a view of the tympanum impossible. Syringing the ear will help, but it would be better if the candidate had this done by his own doctor before examination.